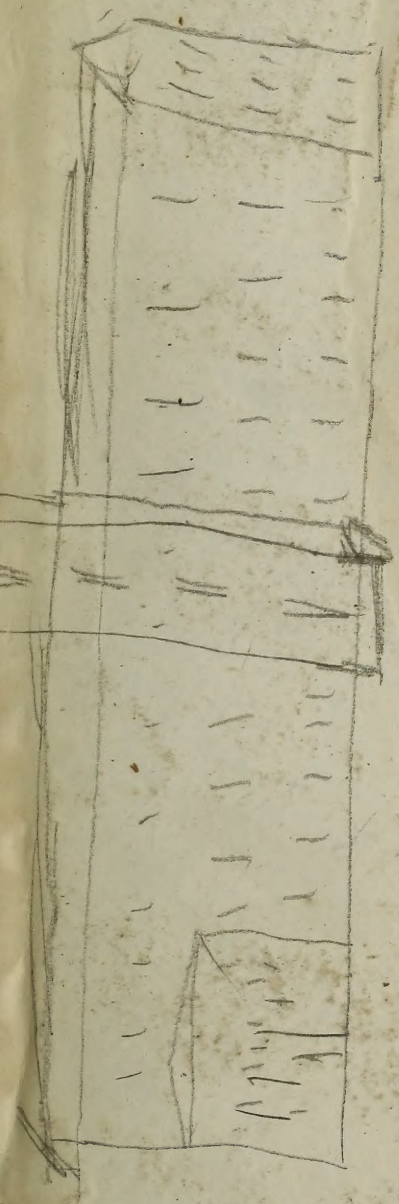
6 v friction strutting full
4 1/2 long 3 in motion
finish Barrel 2 1/2 barrel



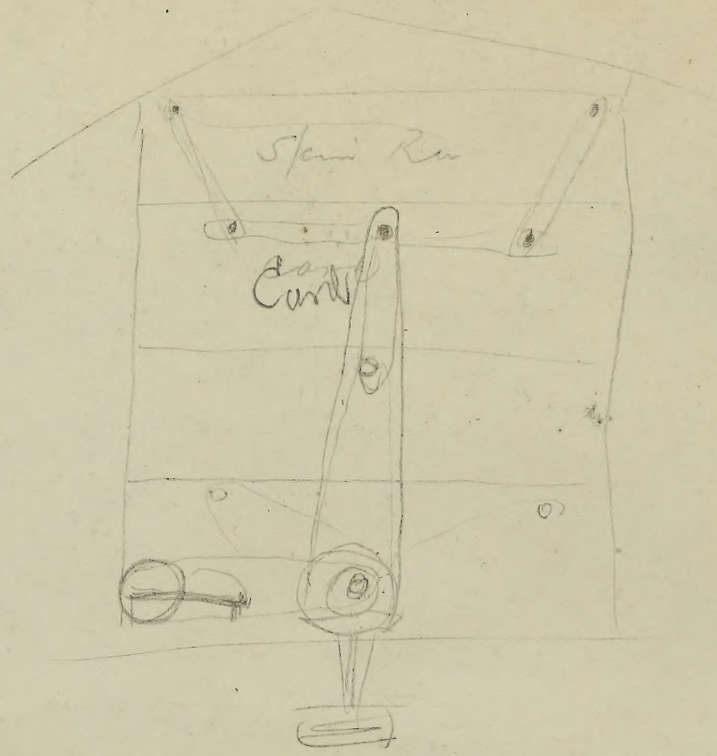
G. SHERRY'S
STATIONERY
BOSTON

From Centre of Cyl. 10½ to side of Bed for Flange & 9½ from Centre for Pipe

James Hunter

Forward 14 1/8
" 18 1/4

FIC HT 60


Spring Rod
Cord

Can wheel to end of Walls going west 26" on line of pack shaft or more

Right angles or in line of where it will be now 15' 6"

Old foundation 38' 3" inside walls + 2'2 outside -

Walls 23" thick on level of floor of first story -

Lapper Room were cast on line of foundation 12'

Tower 15 x 15 now should be 20 x 20'

Beam Room 39' 6 wide -

[FIC HT·60]

Notes

of the

Civil Engineers

Engaged in the Construction

of the

HOOSAC TUNNEL.

.....Chief Engineer.

.....Ass't Engineer.

Notes Begun.....

" Ended.....

Orders for work at James Hunter & Son's, for Hoosac Tunnel

1866.
Jan. 1 — 2 Air Compressors with Frame, Crank Wheels, & Connecting Rods, Cross Heads &c. for Central Shaft.

Jan. 1 — 4 Air Compressors with Frames, Crank Wheels, Connecting Rods & Cross Heads (for West Shaft.) Gear Castings, and Shaft Forgings to be furnished by H. Tunnel —

Jan. 2 For East End H. T. Please make.
One Shaft 2½ in. diam 42 in. long with 2 Collars
2 Pedestal Boxes & Caps to fit Shaft
1 Pulley 7 x 48 in. " " " with 2 steel set screws
1 " 9 x 20 " " " " " " " "

Jan. 4 For Compressor No 1 at East End. Make
One new Cross Tail
" " Brass Valve (Small)
Repair large Brass valve
" Piston Rod

Jan. 5 — James Hunter & Son. Please Repair Connecting Rod Boxes & Pins, for Portable Engine at West end H. Tunnel, Brass castings furnished by H. T.

Jan. 5 James Hunter & Son. Please furnish for Cent. Shaft. 2 Pedestal Boxes & Caps, (Castings only) for 2" Shaft. 2 Collars & one Shaft 3 in. dia 31 in. long Rough Iron.

Jan. 5. James Hunter & Son. Please make for C. Shaft. 2 Shafts with Cone Pullies, One Crank Wheel Pin &c, One Balance Wheel, 2 Pullies, 4 Pedestal Boxes & Caps, all according to Drawing furnished.

Orders for work at James Hunter & Son's for H. Tunnel

1866.

Jan. 8. Please make for Hoosac Tunnel Machine Shop at East end.
8 Iron Stands about 6 in. high, 1 in. bearings {Pattern see new}
4 Wood Rollers 18 in. long 6 to 8 ins dia. Iron Gudgeons, Rings in ends of Wood.

Filled

15. James Hunter & Son. Please make for H.T. Comp. Press. Piping at East End.
The 2 Pieces Cancelled Jan. 17
Flanges 7 in. Pipe 3 ft. 4 in. long to face of Flanges. To be Turned & Drilled same as before. Wanted as soon as Possible. (Straight Hanger)
Also One Blank Head for 8 in Pipe — (Casting is Ordered)

Filled

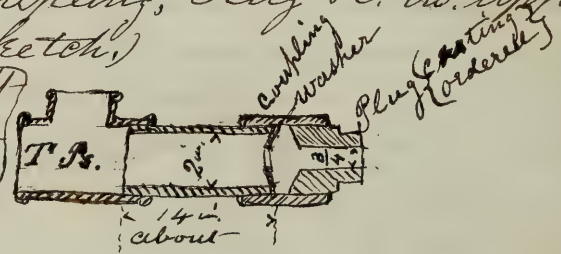
15. James Hunter & Son.
Please furnish for H. Tunnel
To suspend Compressor Piping at East End
24 Lag Screws 5/8 x 5 in

Filled

15. James Hunter & Son.
Please furnish for H. Tunnel
Central Shaft.
2 Stuffing Nuts, and 2 6 in. Hand Wheels {Castings only}
One 6 in Pulley Turn

Filled

15 James Hunter & Son.
Please Fit up for West (new) Shaft, one Piece 2 in. Pipe about 14 in. long with T. B. on lower end, & Coupling, Plug &c. in upper end for stuffing (see Sketch)
Also for West Shaft. One Shaft 2¼ in. dia. 24 in. long to support Sheave Pulley



16. James Hunter & Son.
Please Cast, Turn & Drill for East End H.T.
2 Pieces 12 in. Pipe Regular length, One end of each to have face of Flange same as Paper Pipe Clamps. Opposite ends, one with Tongue & one with Groove

1866

Jan. 17. James Hunter & Son.

Please Cast, Turn & Drill, the following Pieces Pipes

Viz. 3 Pieces 12 in. Pipe Regular length, Flanges Tongue & Groove

3 " 8 " " " " " " " " "

3 " 12 " " length of Measures given " " " " "

1 " 8 " " " " " " " " "

Filled

17 James Hunter & Son

Please furnish for East End H. T.

56 lbs old Telegraph Wire, at 6¢ $3.36

Filled

17 James Hunter & Son

Please furnish about

25 feet 7/16" Chain for West New Shaft. Also

One Bar Hoop Iron.

Filled

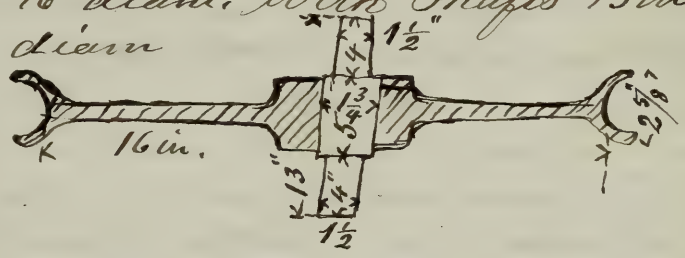
24 James Hunter & Son

Please make for H. Tunnel

for West Shaft

2 Sheave Pullies 16" diam. With Shafts 13 in. long

Bearings 1½ in. diam



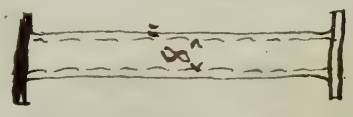
Filled

26 James Hunter & Son.

Please make for East End H. T.

One piece 8 in. Pipe with Straight Flanges, to be

faced up length of measure, of this date.



Filled

[illegible] James Hunter & Son.

Please [illegible] & Turn

One Main Flange [illegible] for [illegible]

at East End Heater Tunnel.

Orders for Work at James Hunter & Sons for H. Tunnel

1866
Jan. 31. James Hunter & Son
Please make for H. Tunnel
for Shop at East End.
One Shaft with Collars & Pulley 36 x 6 for Grindstone
" Pulley 3 in dia. 7 in face 1 7/8 hole to drive "
Use Shaft furnished.

31 James Hunter & Son.
Please make for H. Tunnel
One new Centre piece, with Bearing for
Compressor No 1. according to Drawing furnished

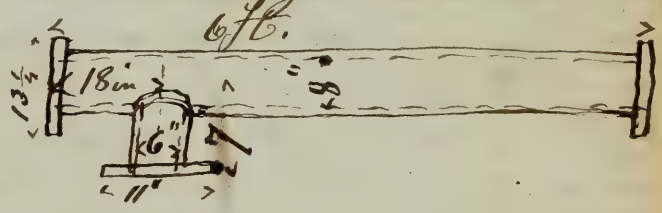
31 James Hunter & Son.
Please furnish Castings
for 2 Boxes & Caps for 1 15/16 in. Shafts, Babbitt
the same, for Artesian Well.

Jan 2d James Hunter & Son
Please Make
order filled
1 Rod 3/4 in. diameter 6 ft 2 1/4 in long
with threads cut on each end
to fit Collarings for pump rod
for Artesian Well

Feb. 5. James Hunter & Son.
Make for East End H. T.
One piece 12 in. Pipe with Flange ~~Tongue & Groove~~ Straight
length of measure of this date. Feb. 5. 1866.
(Bore holes in one end only.)

Orders for Work at James Hunter & Sons for

1866
Jan 8 Please Cast, Turn & Drill the following Pipes for Central Shaft. (All Straight Flanges
6 Pieces 8 in. Pipe regular length Flanges 13¼
2 Quarter Turns (8 in.) " "
2 Pieces 8 in. Pipe with 6 in branch " "
— See Sketch below.
2 Pieces 6 in. Pipe, with 11 in. Flange Mr Hunters Regular Pattern.



Filled

7 James Hunter & Son.
Please furnish for East End Shop
One Hand Wheel 18 in. dia. Hub 3"x3". Core 1⅛ in. Rim 1½ in. diam.
One Coupling 3 in. dia. 5 in. long, 1⅛ in. Core
" Flange 10½ in. " ½ in. thick, Hub 3" dia. 1⅛" Core
(Castings Only)

Filled

10 James Hunter & Son.
Please make for Artesian Well
4 Brass Castings (& Cut threads on same) for top part of Pump Valves, Also 2 Pieces ¾ in. Round Iron, One 5 ft. 2½ in. & the other 6 ft. long, with Threads cut on each end, to fit Brass Couplings
Also make 6 [illegible] (Castings)

Filled

10 James Hunter & Son.
Cast. Turn (& drill one end only)
The following Pipes for East End Hoosac Tunnel
— One pc. 12 in. Pipe. length of measure of this date A. from ~~end of~~ Tongue to bottom of Groove.
— One piece 8 in. Pipe, length of measure of this date B. from end of Tongue to bottom of Groove.
— One piece 8 in. Pipe, length of measure of this date C. from end of Tongue to bottom of Groove.
— One piece 8 in. Pipe length of measure of this date D. from end of Tongue to bottom of Groove.

Filled

Orders for Work at James Hunter & Sons for H. T.

1866

Feb. 10 Please furnish for East End Shop.
8 Malleable Iron Dogs — 16½ lbs.

Filled

19. Please Turn Bevels to about 45° on
2 Pieces 8 in. Pipe For East End H. T.

Filled

19 Please furnish (Castings only) for East End Shop.
2 Pullies one 14 & one 12 in. dia. 6½ in. face 1¼ in Core.
2 Boxes & 2 Caps for 1½ in Shaft
2 Small Ladles

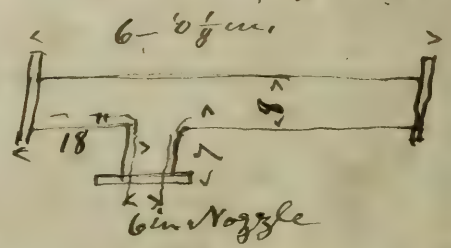
Filled

19 Please Cast Turn & Drill the following Pipes For East End.
One ps. 8 in. length of measure of this date No 1
" " " " " " " " " " 2 with 4" Bra
" " " " " " " " " 3
All the above Pipes Tongue & Groove

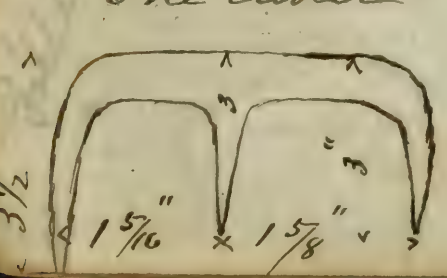
Filled

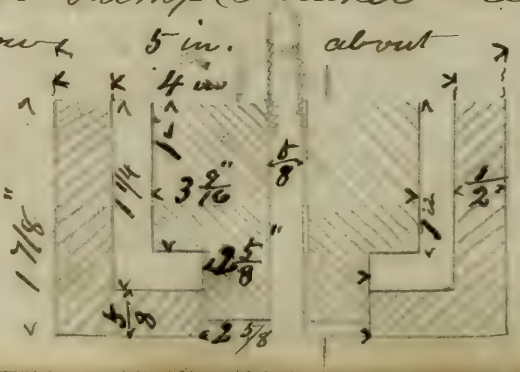
19 Please Cast & finish for East End Shop
One Pulley 36" dia 7 in face bore hole to
fit Wird furnished.

21 Please Cast Turn & Drill the following Pipes
for Central Shaft.
2 Pieces 3 in. Pipe your regular Length one end of Ea 11" Flange
3 " 8 in. Quarter Turns
1 " 8 in. Pipe 3 ft. 6 in. long
1 " 8 in. " like Sketch.
All Straight Flanges



22 Please make for Commonwealth for H. Tunnel
One Former, for 4 in. Pump (Leather Packing)
like Sketch below
One Cutter





Orders for Work at James Hunter & Sons for H. T.

1866

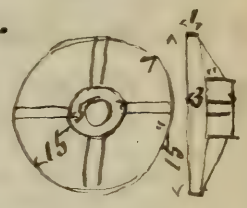
Feb. 24 Please make for East End Shop.
One Pulley (Casting only) 12" x 10" bore 1¼ in.
" " (finishing) 36 x 10" hole to fit Wire

Filled

24 Please make for East End, for No 1 Turbine Wheel
One Bearing in halves, as pr. Drawing of this date.

Filled

24 Please make from Pattern furnished.
12 large Washers like Sketch,
For Central & West Shafts.
Castings only, with 2⅛ in. holes



1866

March 1. Please make for West Shaft
One Shaft about 2 ft. long, 2" journals,
for Sheave Pulley.

Filled

March 1 For Artesian Well
9¾ lbs Babbitt
One small Ladle

filled

March 3 Please make the following Car Wheels & Axels
according to order of Feb. 24 Viz.
40 Pair with Axles for West End
40 " " Axles " East
20 " " " " West Shaft

5th filled

Please furnish for East End
10 lbs. Wire (3 sizes) + 1½ lbs
1 Pc Round Iron 1¾ in. dia 3 ft. long

March 8 Turn & Polish one Friction Grooves & Strap
for Portable Engine at West (New) Shaft
One Forging & one Spiral Spring

filled

Orders for work at James Hunter & Sons for H. Tunnel

1866

March 8.

Filled Please lengthen out 8 Rod (1½ in. Iron) Nine inches each. Forgings only.

March 9 For East End for No 1 Compressers

Filled 4 ¾ lbs Spring Steel

March 14 For No 1 Compressors at East End H. T.

Filled 9¾ lbs. Best Babbitt

2 Small Castings for Portable Engine Check Valves (Brass)

14. Please make for Hoosac Tunnel

Filled 4 Pump Cylinders about 4" dia inside & 14" long Cut Threads on outside same dia. & No. as Sample furnished; Bore inside to fit Valve furnished.

15 Filled For Compressor No 1 at East End H. T.

20 lbs Collars for Small Valves (Castings only)

17 Please make for East Eend Hoosac Tunnel, 12 Blank Heads for Pipes as follows.

One for 12 in. Pipe with Tongue

" " " " " " Groove

" " 8 " " " "

" " " " " " Tongue

4 " " " " Smooth

4 " 6 " " "

All the above to be drilled same as Pipes heretofore

March 17 Please make for East End H. Tunnel One piece 12 in. Pipe ~~this~~ length ~~from~~ of measure of this date from end of Tongue to bottom of Groove. Drill one end only.

Orders for Work at James Hunter & Sons for Hoosac Tunnel

March 22 Please Repair (for Hoosac Tunnel) Air Compressor No 1. Make one new crosshead and 32 small valves (Somore Iron) for the same

Filled

March 24 Please mak for Compresser No 1 (Extra.)

One Cross-head
" " -tail
4 Stands to support side Rods $2\frac{7}{16}$" dia.
4 Side Rods $2\frac{7}{16}$" dia. in centre, same at ends.
3 Connecting Rods with Straps & Boxes
3 Piston "
1 Crank-pin

Filled

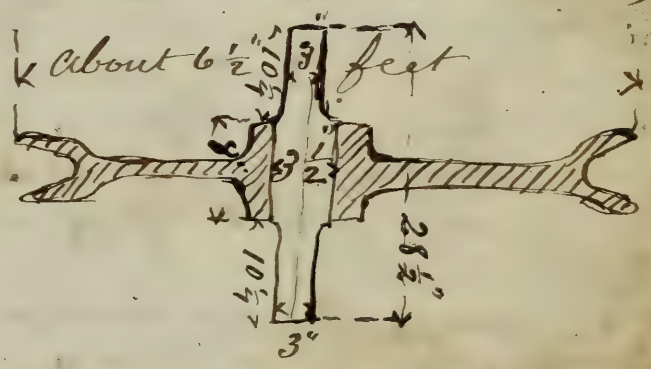
March 26. Please make Shafts, Hangers, Pullies, Stands, & Gears according to Tracing of dated March 24. 1866. Gear Castings to be furnished. (For East End Shop)

Filled

March 28 Please make for West Shaft:
2 Sheave Pullies about $6\frac{1}{2}$ ft. diam. $3\frac{1}{2}$ holes in hubs.
3 Shafts for same $3\frac{1}{2}$ dia. in centre. 3" journals
4 Stands now made 3" dia. (See Sketch)

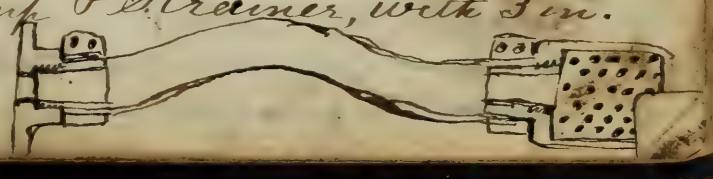
Use the Forgings for Shafts to be furnished by Com.

Filled



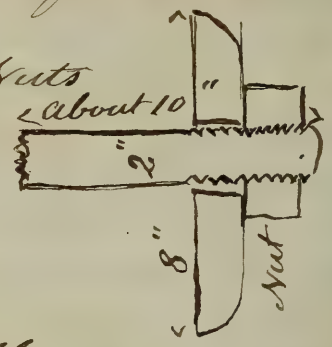
April 2. Please make Shafts, Pullies, Stands, connections &c. to drive 5 in. Pumps at West (new) Shaft as pr. drawing of this date. Also connect lower part of Pump & Strainer, with 3 in. Rubber Hose.

Filled



Orders for work at James Hunter & Sons for H. Tennell
1866

April 4 12 Stub Ends 2" Iron with Nuts
6 Washers 8" dia. 1½" thick,
For Central Shaft,



April 4 Please make for Artesian Well.
One Packing Ring (3 pieces) Bronze
for Donkey Pump.
filled

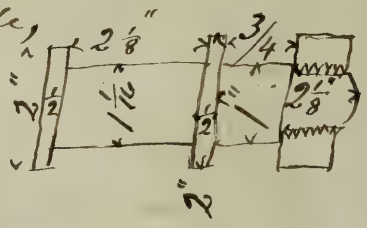
April 6. Please finish for Artesian Well
3 Valves (lower part) for 4 in. Pumps,
Cut threads & fit Small valves Same as Samples
filled

April 10 Please make for Central Shaft Hoisting Apparatus,
Detailed pieces as shown on Sheets No 1-2-3-4
—5—6—7—8. Patterns to be made by Com. Mass.
also Castings for Sheet No 8 to be furnished.
filled

April 10 Make for East End for No 1 Turbine
2 Bevel Gears in halves to planed, Drilled
Bolted with finished Bolts, & Bored for 4 5/8
in. Shaft.
One Pinion to be Bored to Wires furnished,
Castings to be furnished by Com.

Gears were finished by Novelty Works except Splines

April 11. One Crank-pin for 4 in. Pump at Art. Well
Same as heretofore made,



Orders for Work at James Hunter, & Son for H. T.

1866
April 16. For Central Shaft.
One Shaft $2\frac{15}{16}$" dia. 5 feet $3\frac{1}{2}$" long
2 Pedestal Boxes & Caps 10" long for same, Conc. Patt
1 Gear 48 teeth 4" face Mr Hunters Pattern
1 Pinion 19 " " " " "
Holes (in each) bored $2\frac{15}{16}$ dia. & Key-way
Key-ways in Shaft to be given hereafter.
Bore hole in 36"x13" Pulley to fit Wire furnished.

Filled

Apl. 18. Please make for Compressor No 4 at East End
One Crank pin, Same as heretofore made.
Forging furnished by Cont.

See Order of March 24 for Crank-pin

April 20 For Central Shaft.
20½ lbs Best Babbitt

Filled

April 23 Please make 1/2 Coupling as pr. drawing of this date, for Central Shaft.

Filled

April 28 For Turbine Wheel No 1 at East End.
25½ lbs. very hard Babbitt,
1/2 " Antimony,

Filled

May 1. ~~One~~ 2 piece 4" Pipe (Casting only) 18 in. long
Flanges 8 in. dia. also one pr. 3" Pipe, Spigot & Flange
for East End

Filled

May 9. For Central Shaft, Cast & finish
One Pulley 8" dia. 6 in face for 3 in. Shaft
" Collar — — " " " "

Filled

Orders for Work at James Hunter & Sons for H. T.
1866.

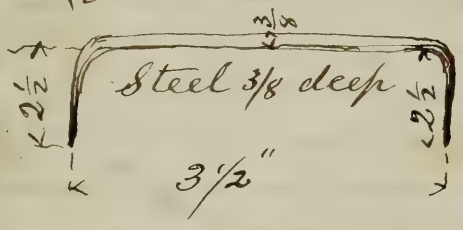
May 10 Make Water Regulator for Compressor No 1
Filled (at East End) as pr. Drawing of April 27, 1866

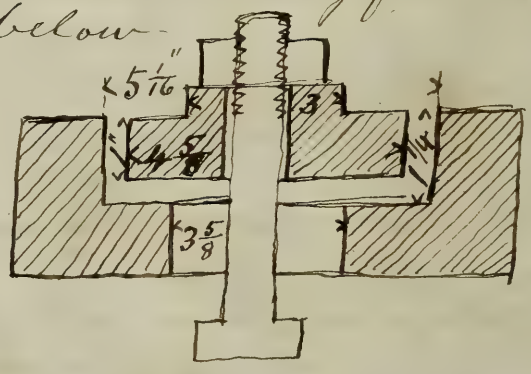
May 15 Repair Steam Engine for Brick-yard, as follows,
Turn off Smooth one end Fly Wheel Shaft, and
Babbitt Pedestal Box to fit the Same,
Filled Repair Connecting Rod by making new Brass
Boxes if required.

19 — 2 Strainers for 4 in. Pump
Filled For Central Shaft (Castings only)

May 23 Two castings from Tanyer switch No. 7 Right
" " " " " No 8 Left
Filled Two " " double. " No 9 Right
" " " " " No 10 Left
Two " " frog No 11 Right
" " " " No 12 Left
Thomas Downer, Ch. Eng.

June 1 One Former for Leather Packing for 5 in Pumps
as pr. Sketch below.
(Also One Cutter)





June 1. Please make for West Shaft
4 pieces (Brass) for 6 in. Pump Valves
like Samples.

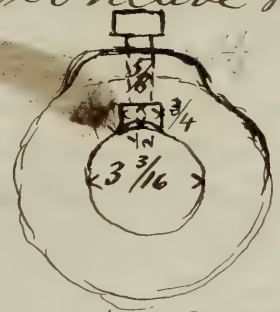
Orders for Work at James Hunters for H. T.

1866

June 6. Please make for West End
2 Wood Frames, or Formers, as pr. Drawing
Wanted as soon as possible

Filled

June 6. Please make for East End, to drive Small Compressors
4 Pullies 30 x 12, to fit 3 3/16 in. Shaft. Faces Turned rounding, Concave Keys about 3/4 in. Square



Filled

June 11. Please make (Castings only) for Central Shaft
1 Box & Cap for 2 1/2 in. Shaft (Hunters Pattern)
100 Washers 3 1/2 in. dia. —— " "
40 " 6 " " —— " "
Also 25 lbs. best Babbitt
} Patterns are in Foundry

Filled

June 11 — 4 Losnoe Iron Forgings to finish like Pattern
Iron furnished by Com. for Compressor No 1

Filled

June 11 — Please make for Central Shaft Hoisting Apparatus and Brake Detail pieces as shown on Sheets No 9 — 10 — 11 — 12 — 13 — 14 — 15 — 16 — 17 — 18

Filled

June 13 Please make (Castings only) for East End.
One Hand Wheel 13 in. diam. Core hole 11/16 sqr
3 " " 7 1/2 " " " " " "

Filled

June 18. Please make for Brickyard Engine.
One Pulley 10 x 2 in. hole like sample furnished

Filled

June 26 For Central Shaft
40 Grate bars like Pattern furnished

Filled

Orders for Work at James Hunters for H. Tunnel
1866.

June 27. Make for Central Shaft Bucket Guide.
Detail pieces, as shown on Sheets No 1–2–3.
Patterns to be furnished by Commonwealth.
Filled

June 27 For West Shaft.
Filled
4 Bolts $1\frac{1}{4}$ in. dia. $8\frac{1}{2}$ in. long, 3 Nuts on each
4 " $1\frac{1}{2}$ " " 9 " " " " " "

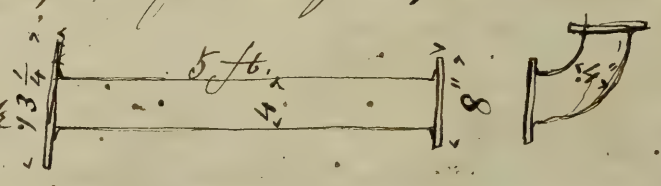
July 2 For Central Shaft
Filled
6 Blank Heads + 2 Stands with Caps = 22 lbs
West Shaft one Hand Wheel = 14 "
" " Repair Valve

July 16. Please make for West Shaft
Filled
One Pulley 40 x 17 Straight Face, to fit
$2\frac{7}{16}$ in. Shaft, Concave Key + 2 set Screws ($\frac{5}{8}$).
One Pulley $25\frac{13}{16}$ on edges, (turned rounding) by
8 in. face; Hub even with Rim. to fit $2\frac{15}{16}$ in.
Shaft. 2 Collars for $2\frac{15}{16}$" Shaft

July 18 Bore 6 Pump Cylinders (5 in.) like
Filled
Sample furnished. Also 3 of each of
Valve + Boxes for the same. 10 Screws to hole
Cylinder to end pieces

July 19 For Central Shaft
Filled
Two 4 in. Quarter Turns.
" Ps. 4 in. Pipe 5 ft. long as pr. Sketch

Also 4 Blank Heads
11 in. dia 1 in. thick



July 25 For Central Shaft
Filled
One Bed Screw + Nut (Old)
" Ratchet Wheel

Orders for Work at James Hunter & Sons for H. Tunnel

1866

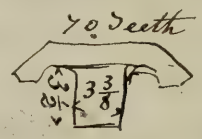
July 25 Please Cast for East End Shaft

Finish To fit wire
- One Pulley 7 3/8" x 4" Core hole 1½" dia. (for 1⅞ shaft)
- " " 9 3/8 x 6 " " " " (" " ")
- " " 9½ x 4 " " " " " " "

Filled

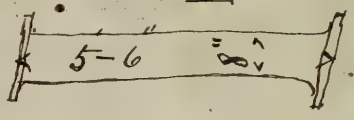
July 26 For Central Shaft.

One Bevel Gear 70 teeth as per Sketch



" Ps. 8" Pipe " " "

Straight Flanges. Squared and one end drilled as usual



Filled

July 27 For West Shaft.

Fit up one Valve with Guides for 8 in Pump.

Filled

July 30 For Central Shaft

Cast (and Turn Flanges) the following Pipes

- 2 Quarter Turns 8 in. diam. 13¼ in. Flanges
- 1 Ps. 8 in. 4 ft. 10⅛" long " " "
- 1 " " " 2 " ¾" " " " "
- 1 " " " 1 " 3¼ " with 6" Nozzle in centre
- 2 " 3 " 2 " —— " " 7¼" Flanges
- 4 2 Blank Heads 13¼" dia. " 3" hole in centre

All the above Straight Flanges

Filled

Aug. 1 For Central Shaft.

one Bronze Bushing 22½" long to fit 6 1/16" Shaft. Bore out hub of 24 tooth Pinion and turn outside of Bushing diam. for Pinion to run loose on same. Hole in Pinion, and outside Bushing to be very round and smooth.

Filled

Aug. 2 For West new Shaft.

8 Screws 5/8" dia. 3" long, Tap 8 holes in Forging for the hoisting Drum for same.

One Eye Bolt 3 in. longer than sample

Filled

Orders for Work at James Hunter & Son for H. T.
1866.

Aug. 6 Please Bore one 5 in. Pump Cylinder (Thick Pattern) same dia. as heretofore. Tap each Flange for Screws same size as before. for West New Shaft.

Aug. 6 Please furnish 200 Brass Castings like sample (Smooth castings)

Aug. 6 Please fill up Key-ways in 2 Shafts and Babbitt one Box for same for West Shaft.

Aug. 22. Repair One hoisting Drum for West new Shaft, Make new friction Band & put in Screws for Wood Laggs, also Eye Bolt 3" longer.

Aug. 23. For West Shaft.
2 Keys 8" long $1\frac{5}{16}$ wide to hold Couplings to Engine Shaft.

Aug. 24 Make for West New Shaft:
One 5. Plunger Pump as pr. Drawing of July 27, 1866. Patterns to be furnished by Com.

Aug. 28. Make for West Shaft
2 Setts Templates for 6 in. Pipe as pr. Drawing of Aug. 27, 1866.

Aug. 29. For West New Shaft.
Repair Friction Band for Portable Engine put new piece Steel in centre.

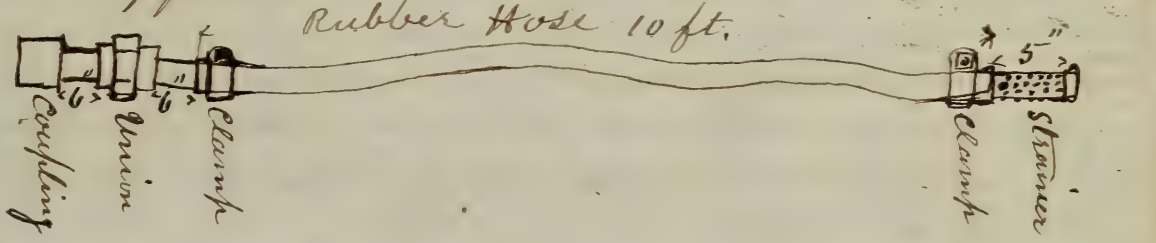
Aug. 29 Make for Central Shaft
2 Setts for Stop, as shown on Sheet No 3 May 17, 1866

Orders for Work at James Hunters for Com.

1866
Sept 6 Please make for East End.
10 Forgings of Com. Somore Iron,
to finish like (Brass) Sample.
Filled
— One piece Round Iron 3½" dia. 28" long (Cast)
— 2 Castings from Pattern to be furnished.

Sept 6. For East End Machine Shop:
One Clamp Pulley in halves,
Filled
9 in diam. 8 in. face hole to finish size
of Wire furnished (about 1⅞ in.)

Sept. 11. For West New Shaft
Put Spiral Wire inside 10 ft 2" Rubber Hose.
" About 8 in. 2" Pipe in each end of same
with Union on one end. Drill for strainer
Filled
on opposite end. See Sketch below.



Sept. 12 Please make for East End Shop,
Filled
3 pieces 2 7/16" Shafting as pr. Sketch
Dated Sept. 11. 1866. Also 6 Pullies as follows
Two 7x6 One 9½x6 One 10x6 One 8x6 one 9x6

Sept. Filled. Make for Rock Drill (for East End).
Detail pieces as shown on Sheet of Sept. 14. 1866.

Sept. 24. For East End Shop,
Filled
One Pulley 20x17 with Concave Key Spline
for 3 3/16" Shaft. Wanted Soon.

Oct. 1 For New Shaft 5 in. Pump.
Filled
Repair 4 Valves

Orders for Work at James Hunters for Com.

1866.

Oct. 4th Fit up Apparatus to drive 5" Pump for new Shaft as shown on Sheet dated Sept. 28. 1866. (Iron Work only.)
Also one Pulley 14"x12" hole to finish 2" dia.
Turn face ~~rotating~~. Plane

Filled

Oct. 6. For New Shaft.
28 Pieces 6 in. Pipe 7 ft. long each, with Straight Flanges to be Turned & Drilled as heretofore. 28 / 7 / 196 ft. in all. One pr. 12" long for Strainer

Oct. 9 For East End.
Bore out Cylinder for Rock Drill as pr. Drawing dated Oct. 9. 1866. also make parts for new Clutch apparatus according to drawings, to be furnished by Com.

Filled

Oct. 9 For West Shaft, 4 Pieces Rail Switches
Put Wrot. Iron Switches in 2 of the Pieces, also
✓ One 4in. L. Plane the Flanges.

Filled

Oct 9. For New Shaft.
In addition to Order of Oct. 4th make
~~4~~ Pump Sweep Strap as pr. Drawing & Patterns
of Oct. 8th (at Smithy.) One cross-head
✓ 24 Washers & 4 Washers. Drill 16 Straps
✓ 6 " (large).

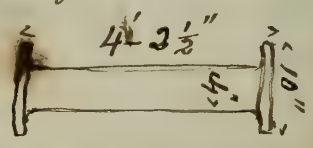
Filled

Oct. 18 For East End Compressor No 2
16 Washers 8 in. diam. 1½ in. thick.

Filled

Oct 22. For Central Shaft.
One piece 4 in Pipe 4 feet 2½ in. long
Flanges 10 in. diam (Casting only)

Filled



Orders Continued.

1866

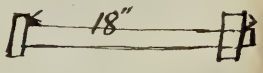
Oct. 30. Make Six Injection Pumps as pr. drawing Dated July 15. 1866.—2 of these Pumps for East Shaft—4 for West Shaft.

Nov. 10 For East End Compressor No 2
3 pieces 8 in. Pipe as follows,
1 piece 4 ft. 8 in. long Turned & one end drilled
1 " 2 " 1 " " " " " " "
1 " 2 " 1 5/8 " " " " " " "
also 4 Flanges 13 1/4" diam. Castings only
1 Wedge piece 13 1/4 dia. " "

Filled

Nov. 15 For East End for Compressor No 2
" 12 in. Pipe.
One Head, Cast Iron
6 Weights " "
One Valve " Brass
" Lever Forged Iron
" Stub End " "
} Castings & Forgings Only

Filled

Nov. 16. For New Shaft for 5 in. Pump
One Shaft 2 1/2" Iron 7 ft. long
3 Pedestal Boxes & Caps for Same
1 Gear 32 1/8" dia. 48 Teeth to fit 4 1/2 in. Shaft
1 Pinion 12 3/4 " 19 " " " 2 1/2" "
1 Pulley 38 X 12 — — " " " " "
6 Bolts 1" dia. 18" long under heads, 

6 Washers for the Bolts.

Filled

Nov. 23 For New Shaft. Oscillating Engine.
Make new Piston Rod, & Repair Piston.
" One new 7/16" set Screw

Filled

Nov. 27 For Central Shaft (Castings Only.)
One 4 in. Piston about 6 ft. long for Pump
" Gland for same
" Stuff Box " "
" Piece 6" Pipe 24" long straight Flanges

Filled

Orders for Work at James Hunters for Com.

1866

Dec 1. For West Shaft.

Filled

One 10 in Plunger To be finished
" Gland for same " "
" Stuffing Box " "
4 in Pipe { 2 Quarter Turns 4 in with common Flanges
1 " Straight piece " " " with one Flange 11 7/8 dia
1 " " " 15 in long
1 " " " 24 in long common Flang

Dec. 3 For West Shaft

Filled

One piece 6 1/4 in. Pipe 3 ft. 6 in long 11 1/2" Flanges
To be drilled according to Paper Pattern

Dec. 3 For New Shaft.

Filled

Cut off 4 ft. 3 in of 4 in. Gas Pipe (furnished)
Drill 8 in. in length of one end 3/8" holes for
Strainer, fit Screw on opposite end to head
at Shaft

Dec. 12. For New Shaft

Filled

One piece 6 in. Pipe 42 in. long 11 in. Flanges Straight
to be drilled (in line) as usual,

Dec. 17 For West Shaft

Filled

1 — 6 in. Quarter Turns 11 in. (Straight) Flange
To be Squared up + Drilled as heretofore

Dec. 20 For West Shaft

Filled

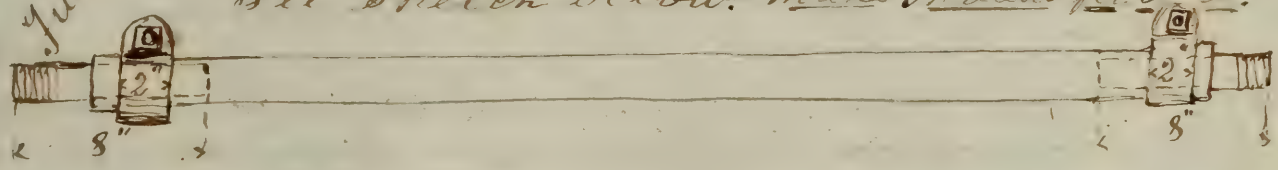
One new Saddle for Walking Beam
2 Caps castings only for 6 in Bearings
1 Yoke " "
8 Bolts 1 1/8 in. dia. length of sample.
1 Pinion (Casting to be furnished) bore hole &
Spline Same as the one broken.

Orders for Work for Com. Mass.

1866.

Dec. 22. For New Shaft.
Fit 2 pieces 3in. Pipe in Rubber Hose.
Secure by Wrought Iron Clamps & Bolts.
See Sketch below. Make Heads fit 3" L.

Filled



Dec. 24. For New Shaft.
Put new Wrot. Iron Friction Band
on Hoisting Drum. Same as heretofore.

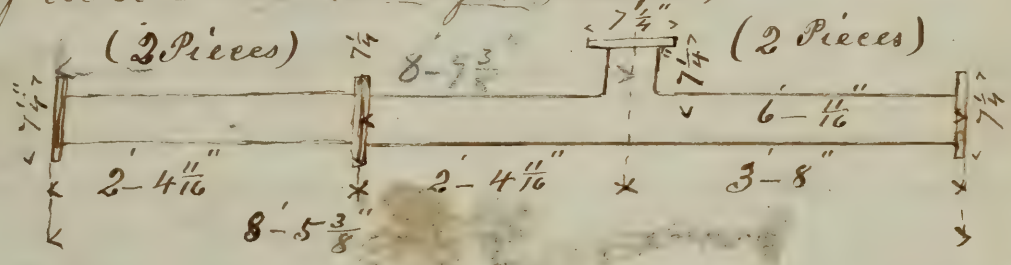
Filled

Dec. 26 For West Shaft.
One piece 6in. Pipe 11in Flanges. (Tongue & Groove)
length of measure of above date from end of
Tongue to bottom of Groove. Wanted, Soon as possible
Drill 5 holes, one on seams.

Filled

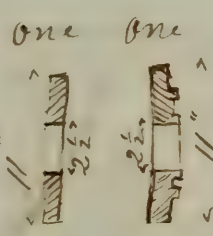
Dec. 27. For West Shaft as soon as possible.
4 Pieces 3in. Pipe to be squared up (and
Drilled on seams) according to measures
of above date (Straight Flanges)

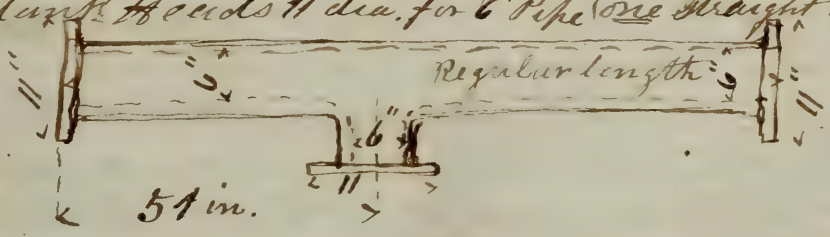
Filled



Dec. 27. For West Shaft. Soon as possible.
One piece 6in. Pipe squared and drilled
as pr. sketch below. (Regular length)
2 Blank Heads 11" dia. for 6" Pipe one Straight one Groove

Filled





Straight Flanges
5 holes, one on seams

Orders for Work for Commonwealth Mass.

1866

Dec. 28 For New Shaft.

Filled

Make 2 Strainers for 3in. Gas Pipe as pr. sketch of above date.

1867

Jan. 1 For Engineers Office (for Fuse making)

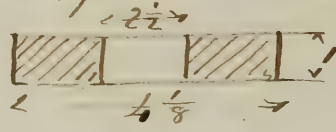
Order Cancelled Jan. 19. 1867

One Gear 8" dia. bore 9/16 hole in frame 1 5/8 hub.
5 – Pinions 2" " " " " " " "
One Shaft with crank
5 " " hooks
5 hooks

1867.

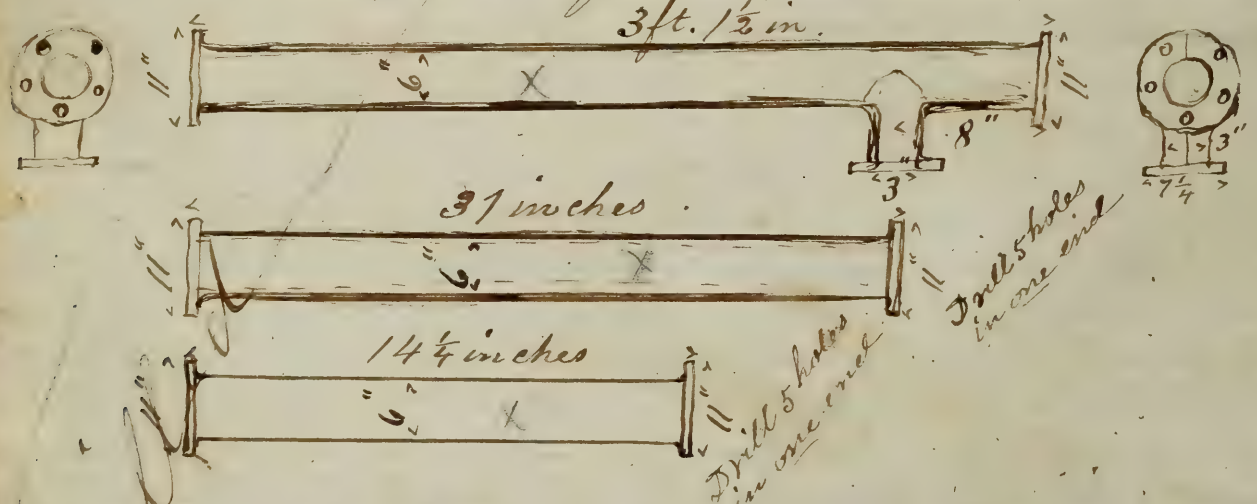
Jan. 2d. Make for Central Shaft. 1 Brass Ring according to sketch. unfinished!

Filled



finished sizes.

Jan. 8. For West Shaft Soon as possible
3 Pieces 6in. Pipe according to Sketches below, to be squared up & drilled as below

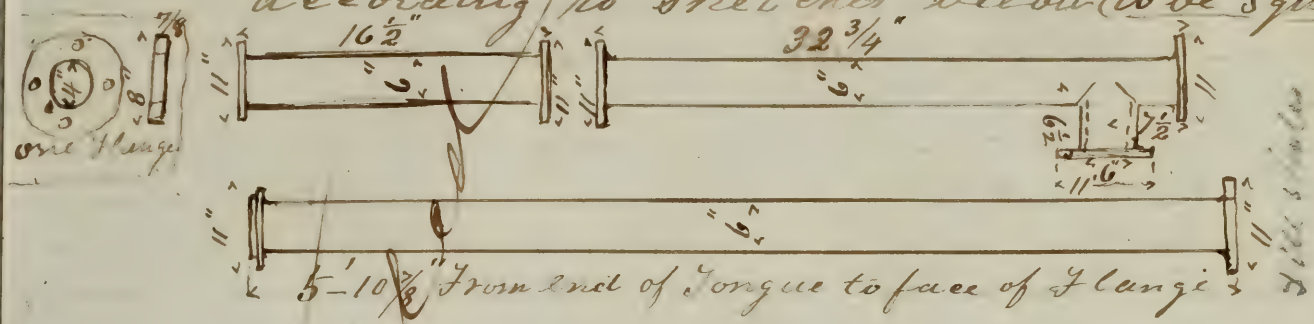


One Blank Head for the above 3" Nozzle to be tapped for 1in. Gas Pipe
One Blank Head 11in. to Tapped for 1 1/2 in Nipple,
One 4in. Quarter Turn, with 8in. Flange on one end and 11in. Flange on other end, Drill 11" Flange & holes for 6" Pipe. Also one Blank Head 11" diam. not to be Drilled.

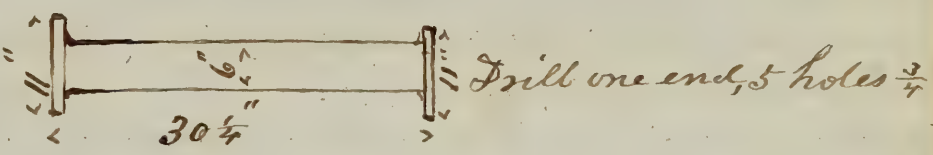
Orders for Work for Commonwealth, Mass.

1867

Jan. 10. For West Shaft Soon as possible.
2 Pieces 6 in. Pipe and one Flange cut according to Sketches below (to be Squared.



Jan. 11. For West Shaft Soon as possible.
One piece 6 in. Pipe as pr. Sketch below.



Jan. 15 For West Shaft.
Put Clamps (Wrought Iron) on one piece 4 in Rubber Hose.
Filled

Jan. 19. For West Shaft.
Cut off 2 Pieces 4 in Pipe and put Threads on one end of each.
Filled

Jan. 28. For West Shaft.

2 — 6 in. Quarter Turns 11" Flanges		all Straight Flanges
1 pr. 6 in. Pipe 12 in long 11" "		
1 " " " " 10 " " " "		
1 " 4 " " 24 " "		
1 " 6 " " 4 ft. long (on hand) with one Blank Head, 8" in length of one end, also centre of Head Drilled 1/2" holes for Strainer.		

all wanted soon as possible.

Filled

Orders for Work for Commonwealth Mass.

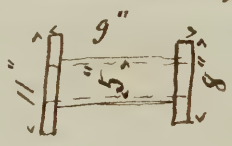
1867

Jan. 28. Make for Central Shaft.
Shaft. Stands. Gears. Straps. Crank-pin &c.
for 4 in. Plunger Pump as pr. Drawings
of the above date.

Filled

Jan. 29. For West Shaft.
One piece Wro.t Iron Pipe 5 in. dia. 9 in. long
with Flanges on ends as pr. sketch below

Filled



Jan. 29. For West Shaft.
Filled
Cut Grooves in 2 pieces 2 in. Gas Pipe
to hold solder.

Feb 27 For West Shaft
One Flange 9½ in diam 5 in hole
3⅝ thick finished core holes like Templet
4 Bolts 5½ × ⅝
~~2 Flanges 9 in diam fitted for 2½ in~~
Gas Pipe

Nov 1st For Central Shaft.
4 Grate Bars
1 Tee Pipe (6 in.)
1 Blank Head

March 25. For East End. (Castings Only)
2 Clamp Pullies 12" × 6" face for 2 7/16" Shafts
2 " " " " " " 1 15/16 "
2 heavy stands (See new Pattern)
Also one valve for Donkey Pump at C. Shaft.
" " Tapering Former for Smithery E. End

May 2nd 1867. For West new Shaft

2 pieces 6in Pipe one end grooved one plain

2 " " " " plain flanges with

Filed

one 6in Branch & one 4in Branch. 6in Branch 3ft from center to end. the 4in about 12in from the 6in.

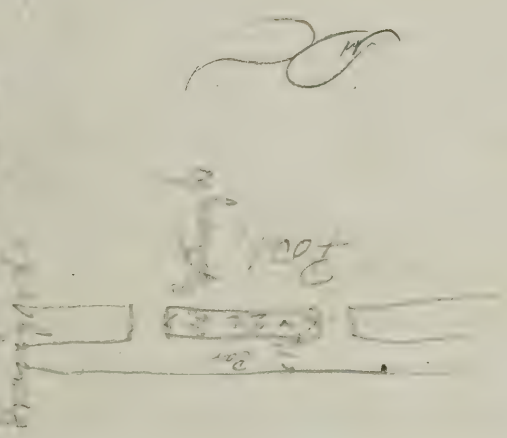
2 Blank Flanges for 4in Pipe

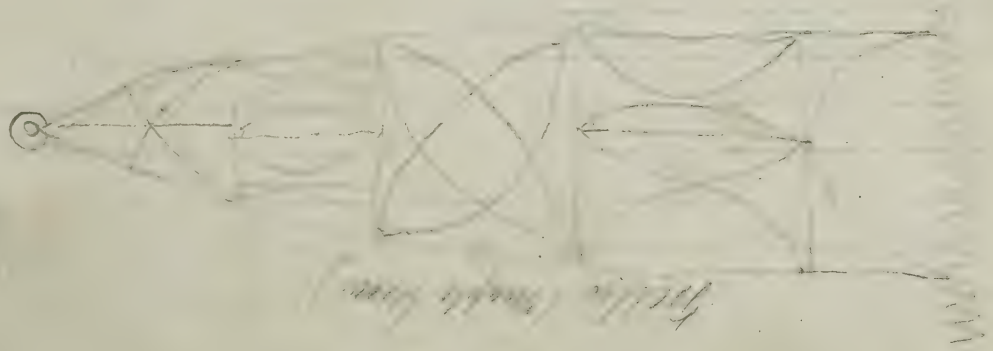
2 " " " 6in " 1⅛ thick

2 " " " 6in Hole for 4½in pipe

Filed May 30-1867 For East End Shaft

1 Pulley 30 X 17. hole size of Main Grooving two Splines 5/8 thick

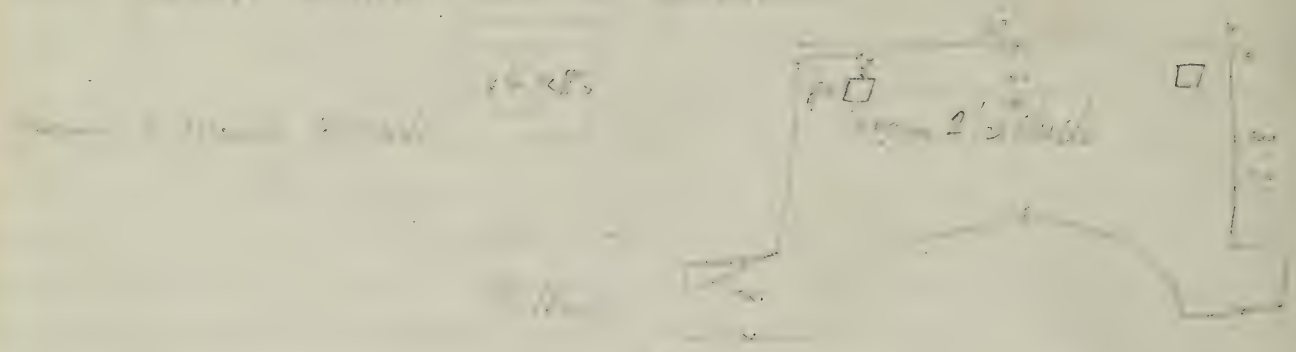




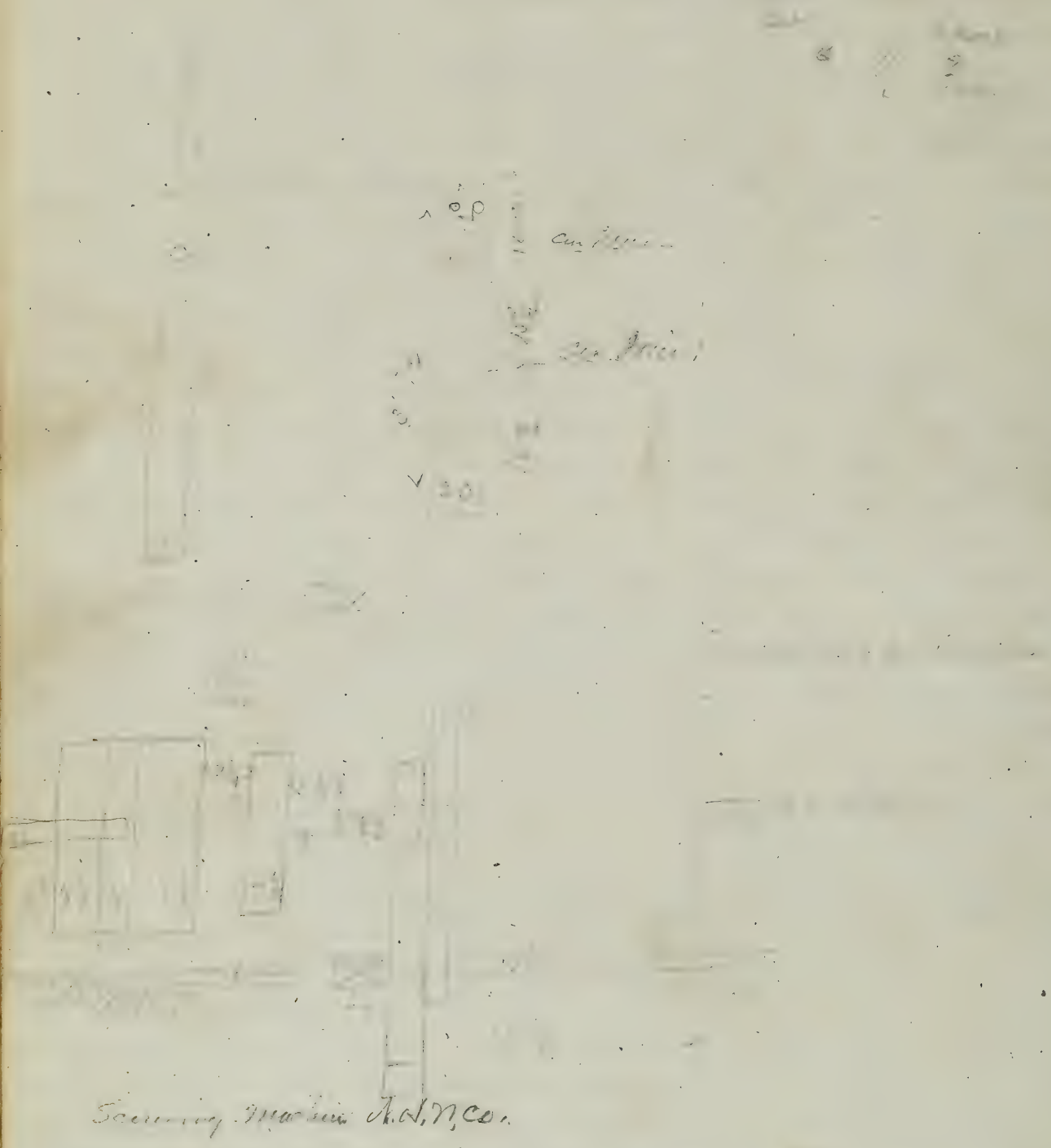
C B

"Lancaster Fire Engine"

June 21st 1870



Mounting Gear. C. T. Sawyer Architect
July 18th 1890 —



Sawing Machine N.D.N.Co.

Rods 1 3/4 cen to cen. Gear 2" face. Top of box to top of rods 10" —

Spider & follower Ring — for Sampling Engine
L & Annally Point vessel — Sept. 6th 1871 —

Ring 2½ wide — between Spider & follower —
11/16 deep but bottom — now, must be made to accommodate
the new fillets made — make 3/4 both —
1 Ring below & 2 above — Each 3/8 thick
to be for Pattern Shop — per —
Send Iron Pattern — Dimensions & Castings to be sent

10" Cyl. Engine. 20" Stroke. Sept. 2nd 1870 –

Cen. PR to Cen valve stem $9\frac{15}{16}$ (912 Eng) –

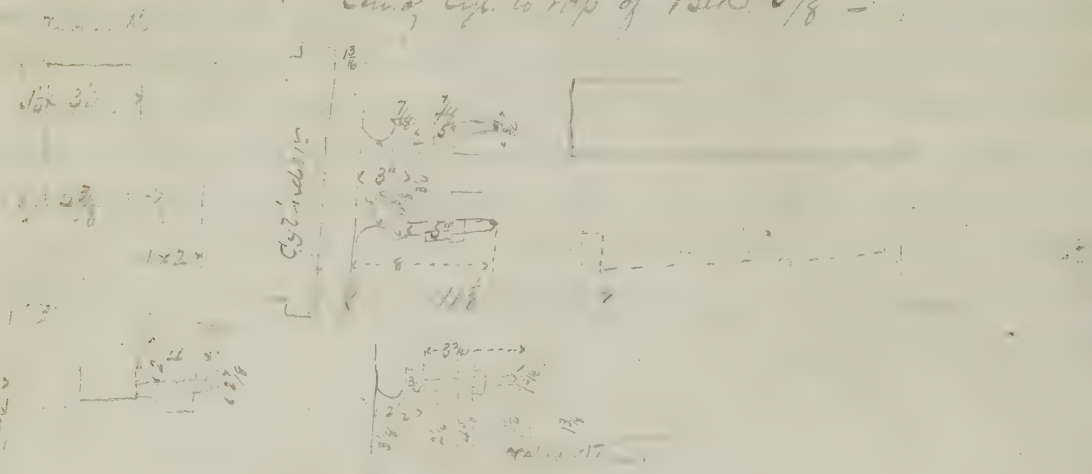
Piston 2" diam. " " $1\frac{1}{4}$ diam – Valve Stem Stand

Cylinder Heads $15\frac{1}{8}$" diam finish – 5 Bolts – $1\frac{7}{8}$ Nut.

Bolts $\frac{15}{16}$ from outside edge to center. $1\frac{3}{16}$ thick finished cyl. Heads

Finished 24 to mach. 22 1. Cen mach – Length 10' $7\frac{1}{2}$" Top – 10' $9\frac{1}{2}$" bottom.

Cen of Cyl. to top of Bed $5\frac{7}{8}$" –



Crank Shaft Diam $4\frac{3}{8}$ in Fly Wheel $4\frac{1}{4}$ bearing 9 in Eccen. Block 4 in

2000.

26 / 166.66 / 6.40
156
100
104
40

1.125
28
9000
2250
31.000

31416 / 31.5000 / 10.02
31416
84000
62832
11680

1.125
60.
31416 / 67.500 / 21.48
62832
46680
31416
152640
125664
269760
251328

1.125 tenths –
26
6750
2250
31416 / 29.25 00 / 9.628
27274
197560
188496
90640
62832
278080

10.875
3.1416
6250
10875
43500
10875
32625
34.1649000

1.125 / 34.1649 / 30.3
3375
4140

1.125
31
1125
3315
31416 / 34.875 / 1.10
31416
34590
31416
3174
31416

3240

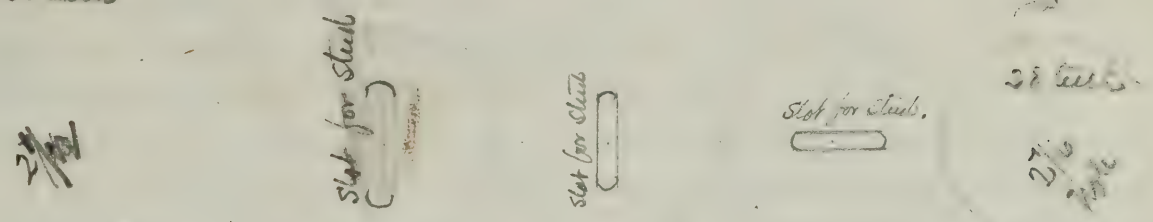
10.941
3.1416
66646
10941
43764
10941
32823
1.125 / 34.381 2456 / 30.5
3375
6312

48 3/8" cen to cen Shaft.

The proportion to be taken is 30 on Drum & 14 on Leader.

3 Intermediate Gears.

60 teeth



Each 11.1" diam. 31 teeth.

48 3/8" cen. to cen. shafts

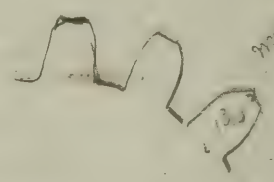
60 teeth 1 1/8 Pitch cir. 67 1/2 diam = 21.48 ÷
26 teeth 1 1/8 Pitch circ. 29.25 diam = 9.63 ÷ 2 = 4.81
10.74
Sub. 15.55
48.375
Space to be filled by 3 gears. 3) 32.825
10.941 diam.

28 teeth 1 1/8 Pitch circum. 31 1/2" diam = 10.03" ÷ 2 = 5.01
60 teeth " " " 67 1/2" " = 21.48" 10.74
Sub. 15.75
48.375
Space to be filled by 3 gears. 3) 32.625"
Each gear will be 10.875"
Intermediate gears each 10 7/8 diam. 10 7/8" diam.
" " " 34 1/16 circumferen.

Take the first No. of teeth viz: 26 + 60. to cal. for Intermediate gears then by altering studs in slots will be right for the latter No of teeth in Leader viz: 28.

Gear for Fire Pump. Monstown Mfg Co. Monstown Mass
October 4th 1890.

8" face. wooden teeth



$18\frac{1}{2}$ to Point

$16\frac{3}{4}$ to root

$16\frac{15}{16}$ diam. coupling

$53\frac{15}{16}$ out

$50\frac{7}{16}$ at root

$3\frac{1}{2} - \frac{1}{2} = 1\frac{3}{4}$

$3'\ 8\frac{1}{4}''$

$3'\ 6\frac{3}{4}'' + 1\frac{1}{2} = 3'\ 8\frac{1}{4}$

Pitch 2.362. $2\frac{11}{32}$ ins.
Depth teeth (Pitch) $(1\frac{2}{32})$ $1\frac{11}{16}$
Thickness " " $.9 = \frac{29}{32}$

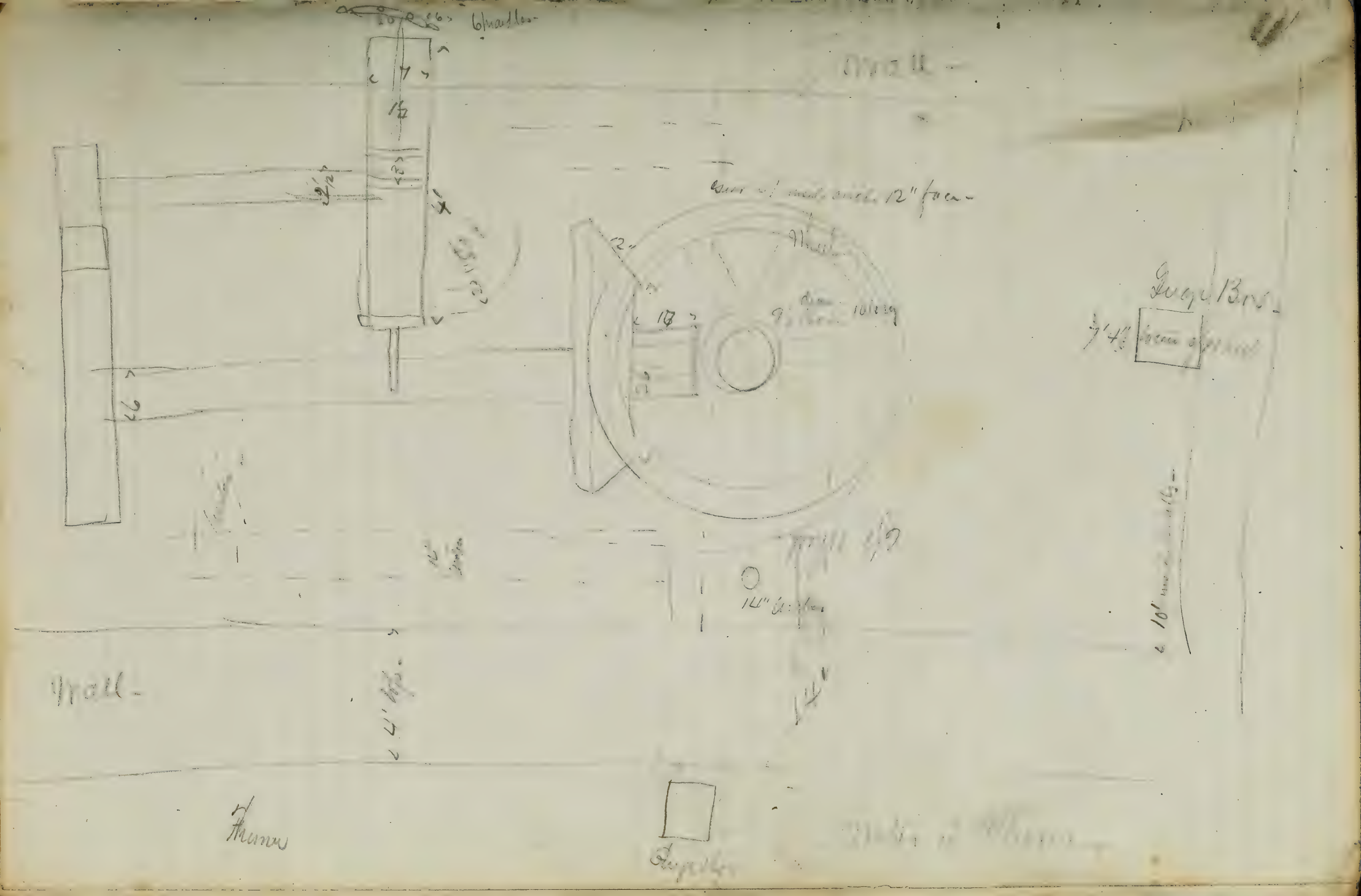
Clamp Gear for Central Engine — Dec. 9th 1875 —

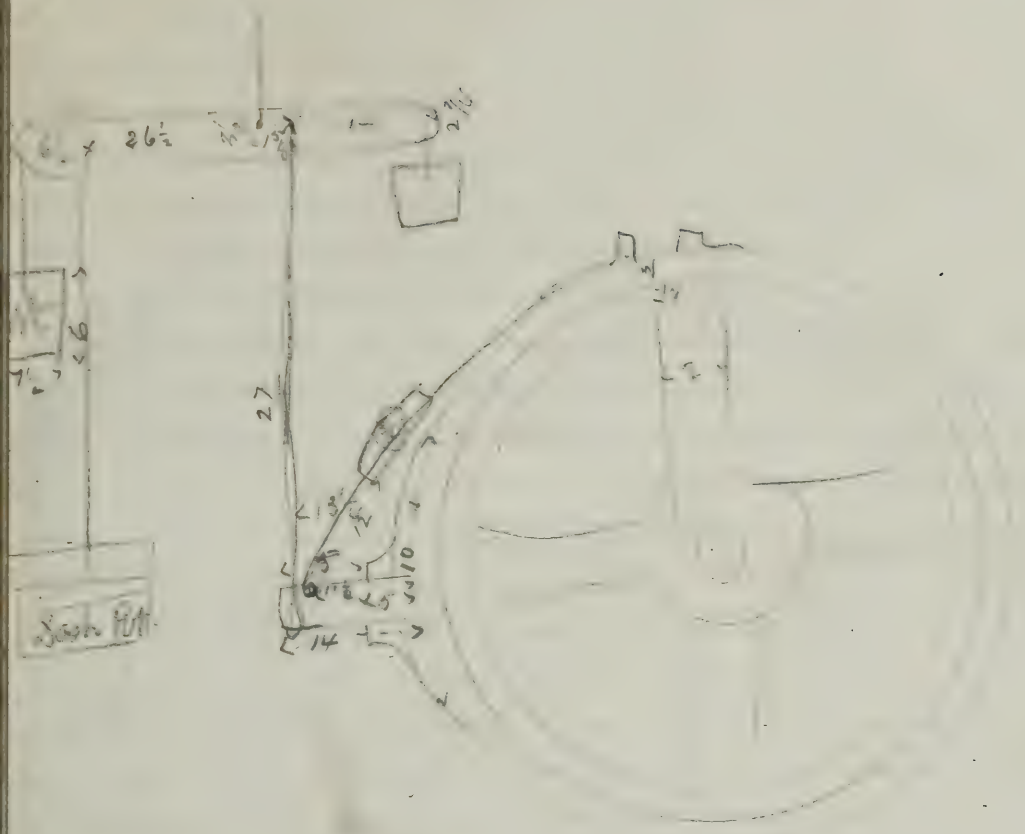
[illegible] per form Drawing May 6th 1870 —
Diam. P.L. 2' 5 1/16" — P = 3.825" — Thickness teeth 1.785. Space 2.04
outside 2' 7 3/8 — Whole depth teeth 2 5/16" — 16" [illegible]
at bottom teeth 2' 2 3/4 — diam Hub 11" — 5/32 [illegible]

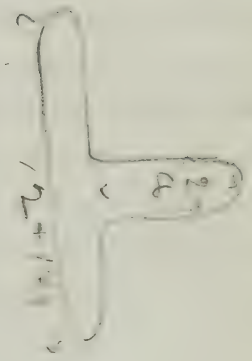
5 1/4 1/64 left [illegible]

Dimensions from [illegible]
diam outside 31 1/2"
" P.L. 29" — 2 1/4 inch
[illegible] form Drawing at Pittsburg

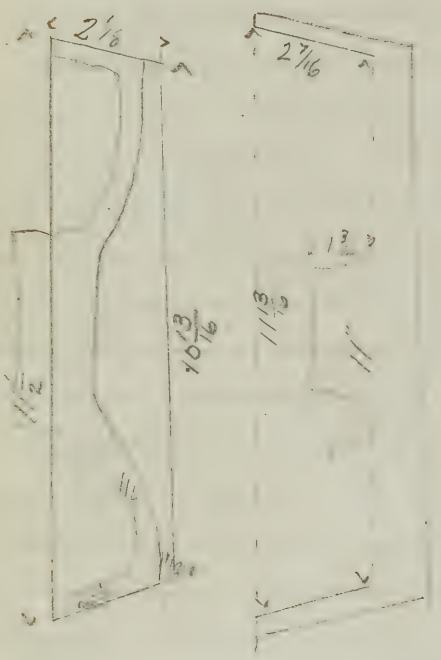
To be 12" face, 2 1/4 inch.


Wall
Thumb
Gauge Bars


26½
27
14
Sixth Hill



Section Chute C. Annual Report Page [illegible]
Aug 15th 1871



Mulloy Gaspers Bell System
~~Bell Chute~~
Patented Oct 24th 1871

[illegible]

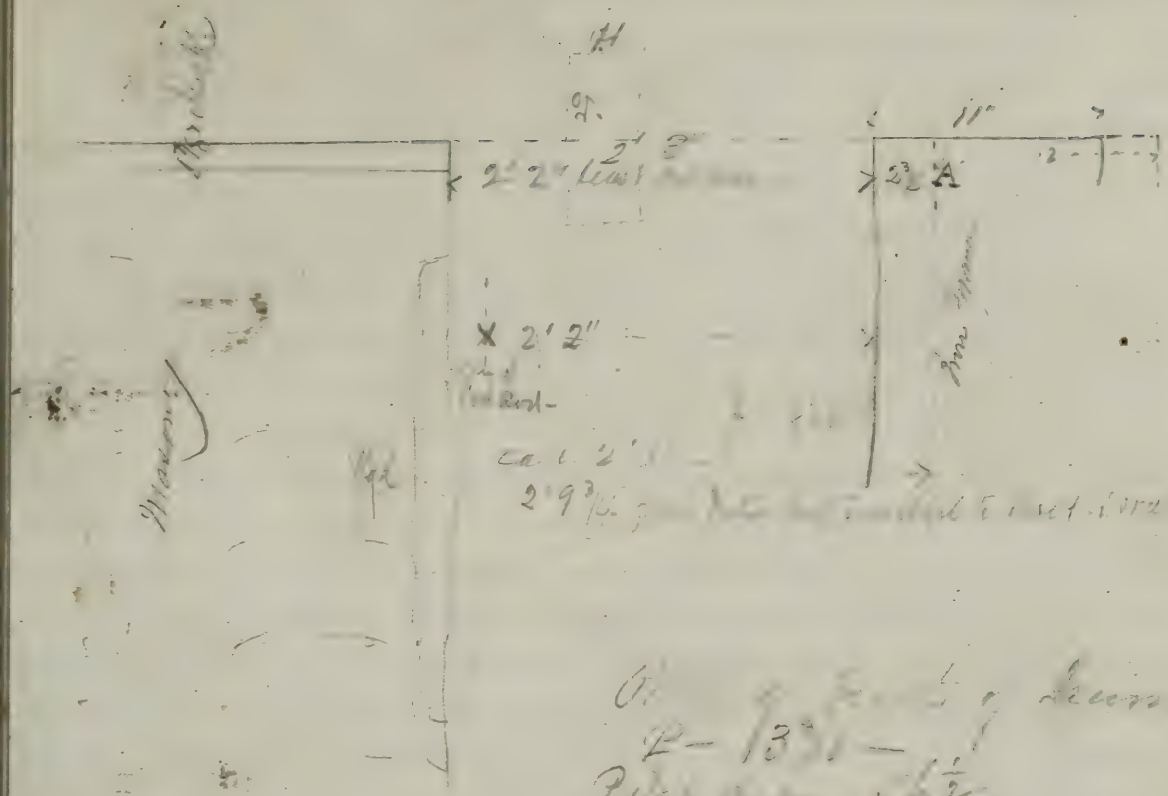
[illegible]

[illegible]

23'
13'

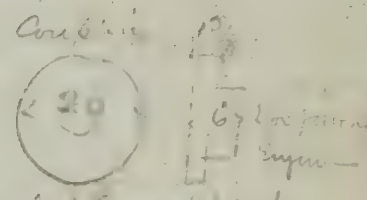
Notes on Pumps at Central Shaft

Make the cone stand alone & leave it not quite cut and screw on the rest. Make wire in Concrete 1/8 for 2" shaft.



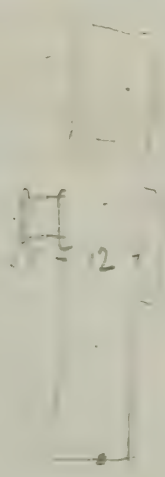
Or [illegible] 2 — 13 3/4 —
2 [illegible] 1 1/2 —
3
[illegible] + 12 = 39 —

~~29~~
21
11
10



Make sketch carefully!

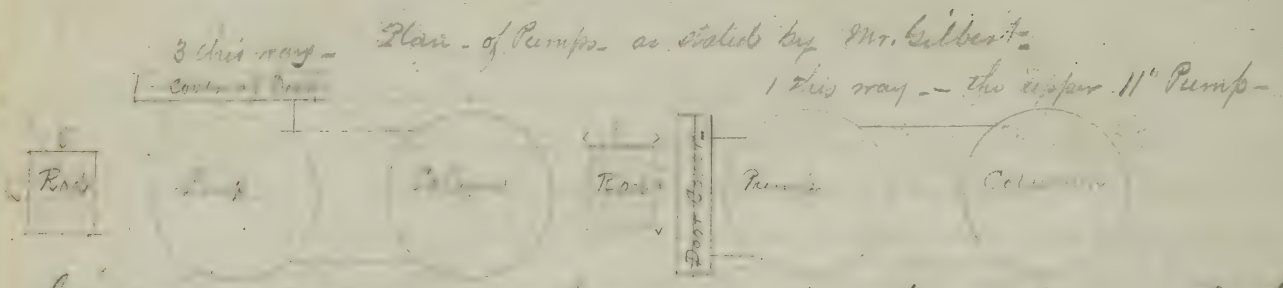
Cut 8" in [illegible] at
[illegible] centre [illegible]



W. H. Bailey
Bradford Belt Co.
Fitchburg, Mass.

Notes on Pumps at Central Shaft — [illegible] April 8th 1[illegible]

Plan of Pumps as stated by Mr. Gilbert —



Grade was struck Aug 15th 1870 — Sw. 1st com heading Cross cut was [illegible] Struck March 28th 1871 — at Central Shaft Hence Incline 202 fm shaft to water level —

Gear	[illegible]	7.9 — 22	[illegible]	[illegible]	[illegible] face
"	Intermediate	12.08	[illegible]	[illegible]	" "
"	Engine Shaft —	22.28 "	3" "	23 "	10 "
"	Intermediate —	55.72	3"	58	10" "

Pump shaft Gear 2' Gear —

P. 4.2 — 57 teeth. Diam. teeth = 1.93 — Diam. [illegible] — 1.61

[illegible] = 1.26, whole depth of tooth — 1.61 + 1.26 = 2.94

Diam. of Rim = 72.56 ins. — thickness Rim = 2¼ — [illegible]

[illegible] Rim is slight as [illegible] 4 ins by [illegible] Rim —

P.D. Gear 73.1" — 4½ Pitch of teeth — 64 teeth — Gear.

" " 37.8 — 4½ " " 28 " Pinion —

Gear as made — [illegible]

21. " 72.2" — 64 teeth — 4½" Pitch — 12" face

" 68.84" — whole depth of tooth = 2.94" — thickness Rim = 2½"

[illegible] 26"

Pinion = 36.1 — 28 teeth — 4½" Pitch — 12" face —

Revolutions — 1 : 5.24.

40 revolutions Engine shaft = 7.9 rev. of Pump —

[illegible]

[illegible] = 55.36 — 58 teeth 3" Pitch 10 face —

= 53. — thickness Rim 1⅝

Sizes of Plungers of Pumps for Central Shaft

No 1 – 11" diam – core 8". No 3 – 10 7/16 diam – core 8"
" 2 10 5/16 " " " " 4 10 3/16 " " " "
Bottom Drawing Lift " 5 10 3/16 "
No 5 Barrel to be bored for Bucket, and 6 ft at least 6 ft long –

No 1 – 11" Plunger 241' – 8" Lift – 9968.125 lbs wt. of column of water
" 2 – 10 5/16 " 241' 3" – " " 9986.167 " " " " "
" 3 – 10 7/8 " 263' – 8 " – 10628.750 " " " " "
" 4 – 10 3/16 " 235. 9855.595 " " " " "
" 5 – 10 3/16 " 35. 1393.437 " " " " "
Sum of all Lifts = 41781.999 lbs wt of Column water
this at 8 strokes 4 ft. high per minute = 1321024 lbs 1 ft high in minute
÷ 33000 (1 H.P.) = 40 Horse Power – add 1/4 for working friction and
the Power required = 40 + 10 = 50 Horse Power.

Area of 11" Plunger = 95.033 sqr. ins. = .66 sqr. ft. x
" " 10 5/16 " = 93.947 " = .652
" " 10 7/8 " = 92.885 " = .645
" " 10 3/16 " = 91.812 " = .637 " x 4' Stroke x 8 times per minute.

Capacity of 10 3/16 Pump = 91.812 sq in x 92 ft = 3525.808 cubic inches –
÷ 277 cub. ins in gal (Imperial) = 127.28 gals per minute
deduct 25% – 25.5 for waste –
101.83 gal. per minute –

4 – 11" Plungers – .66 sqr. ft area x 1019 ft. lift = 670.56 cub. ft
x 62.5 = 41.910. lbs – wt of column of water –
to be multiplied by 8 x 2 – strokes x lbs. per minute –
= 1,341,120 lbs 1 ft high per minute – divide by 33000
= 40.64 Horse Power – add 1/3 for friction, and
+ mehaw 54.2 Horse Power to drive the Pumps

2.31 ft = height equal to 1 lb per square inch 1 height x wt.

11" Plunger @ 3 ft. Stroke = 14.81 gals per Stroke. 2 [illegible] = 102.67 gal. per min.
Wire Cable weighs per ft. 3.1 lbs – 1030 x 3.1 lbs = 3193. lbs – average time to go 1030 ft. = 3.8 min.
weight on each Hoisting Drum = 3193 + 4272 lbs = 7465 lbs – velocity = 32 ft. per min.
Buckets at Central Shaft – 3' 4" diam inside
6' – deep
Estimated weight 900 lbs – add for Balls & Straps lbs = 1000. lbs – contains 52.35 cub. ft. of water – weighs 3272. lbs.
weight of Bucket & water 3272 + 52 lbs

4 —
3' 9 1/4
3 2 5/8
— 7 5/8

Cen of main Pump shaft to Cen Pump

32' 10
2' 10
35' 8" = distance from Cen Pump Rod to center of Crank shaft.

35' 8"
7 —
28-8"

Corrected 35' 10 1/2" nis —
from cen Pump per Shaft to Pump Rod cen.

½ smaller

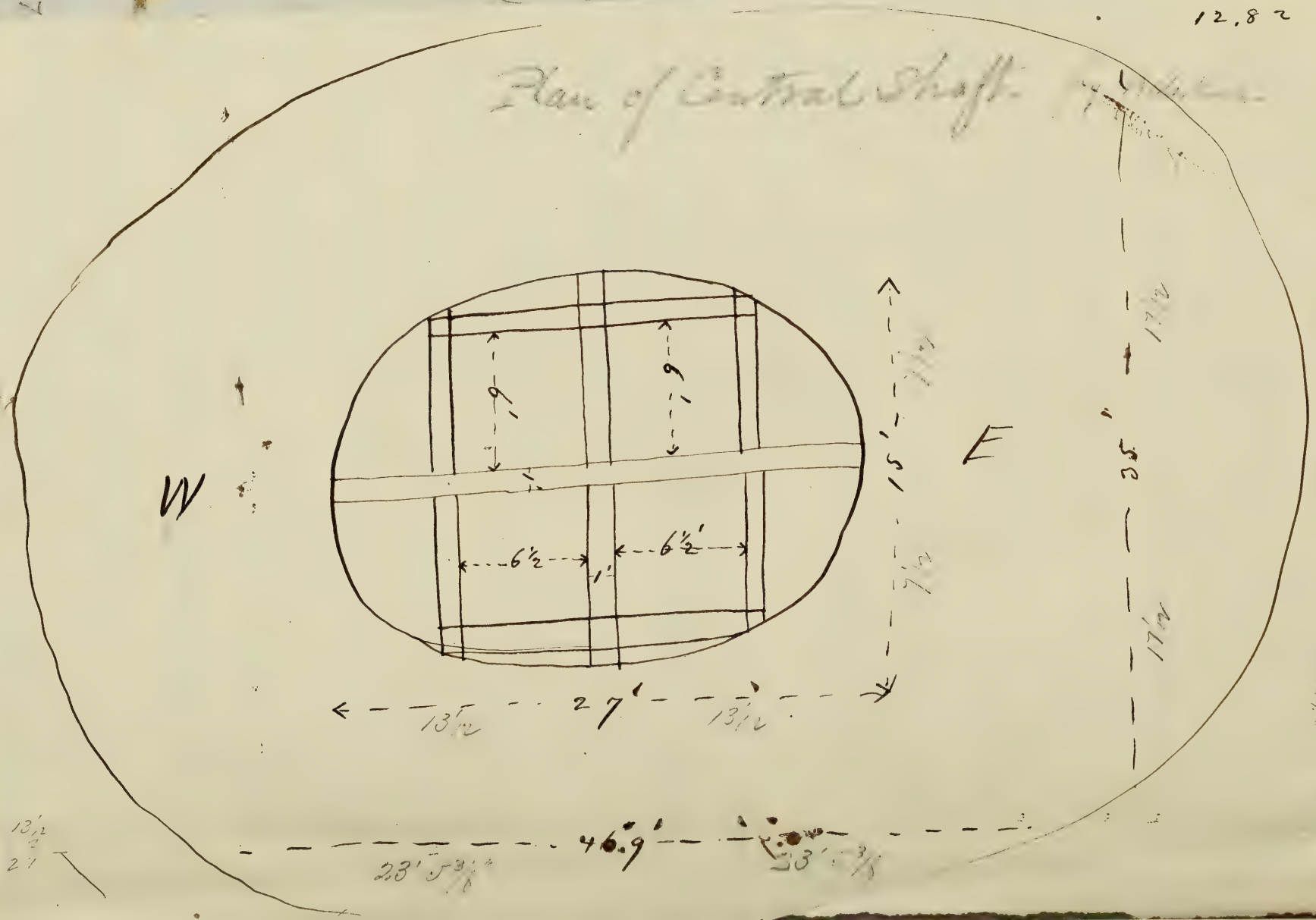
Mem. Orator

[illegible] neyl. Hist.

4
3' 9 1/2
3 2 1/2

12.82

Plan of Central Shaft



Piston rod Engine Shaft. to be made 2½ smaller
present diam = 20⅝ diam
2½
15⅛

Stuffing box of Pumps is in enlarged when destroy holes and placed

11" Plungers weighs 984.5 lbs — each — estimated 115 / 99 / 131.72 weighs 1115 —
Piston Rams " 1600 —

Block to block down the 8" Stop Rod
7'-11 5/8 outside to outside
Not. Prof. 12" square stick. Socket Hole must be made.
16" deep - to correspond with Pattern of feed screw.
Bdm Not.

Plate for Main
7' 11 5/8 outside to outside
Block to lock down the 8" Shaft Box
19" Sq.
Bol. Nos. 12" square stick. Socket Plate screwed on wood.
10" deep - to correspond with pattern of pad pieces.
Bolam Nos.

Line of Mouldings

Sizes of Shafts for Circular Saws & Rings [illegible]

[illegible] Shaft — [illegible] Inside Bore — [illegible] Bore

[illegible] 11 — 2 — [illegible]

[illegible] 3 — 6 — Bull [illegible] Shaft [illegible]

[illegible] —

Number & Size of Bolts — or Pins at Central Shaft

16 —, 1¼ Bolts, 16" long, screwed into Stuffing Box — for [illegible] — 2 Nuts on each Bolt —

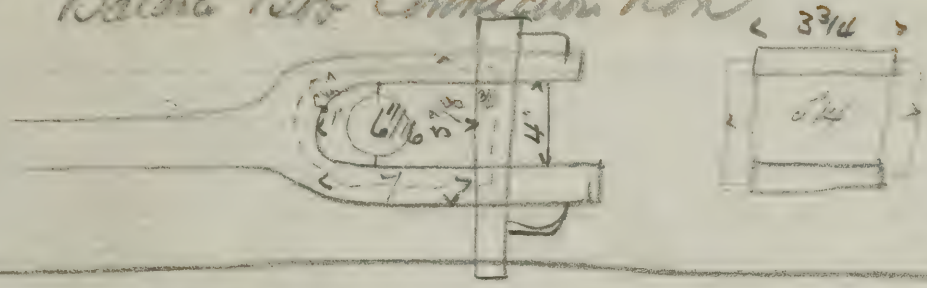
330 — 7/8" Bolts — for Flanges, square heads & Nuts — each [illegible] 5½ long [illegible] — drawn cut [illegible] 12 [illegible] pl —

12 7/8" Bolts — threaded on one end Nut on other & screwed into Flange —

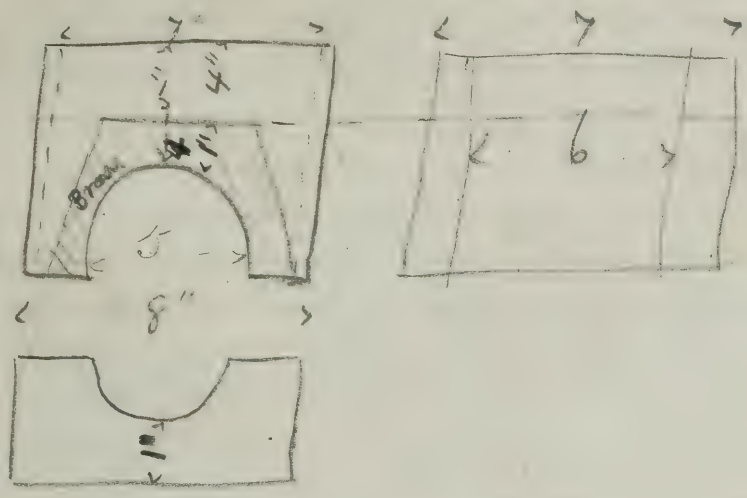
[illegible] 5 — 1¼
14

Friday June 26th 1871 –

Balance Bar Connection Rod



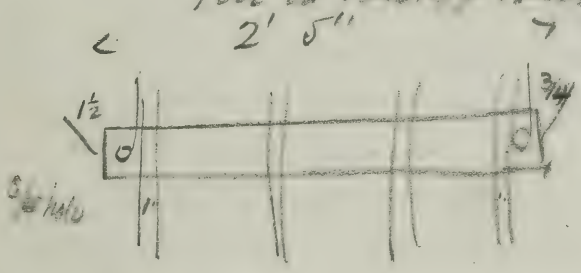
Pump Rod Connection –



6 11/16
1 + 3 = 4
2 11/16
1/2
3 3/16
3 1/2

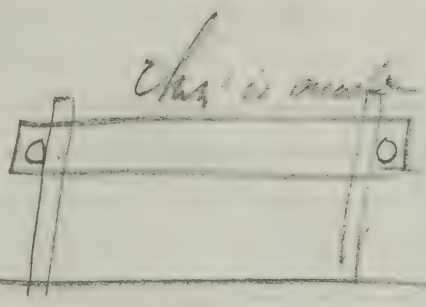
7 11/16
6 11/16
9/16

Pin in Bishop Head & solder Bell crank prop.



this will be filled up at Central Shaft –

June 26th 1871 – 27th Friday

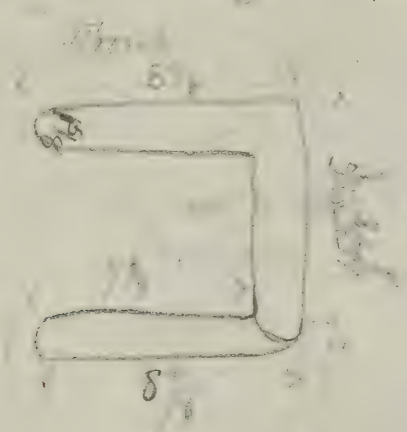


79

July 3rd 1911 — Centre Shaft —

Pin in Bishop Head to 5" diam turned at Shaft —

2 of this material.



July 3rd 1911 —

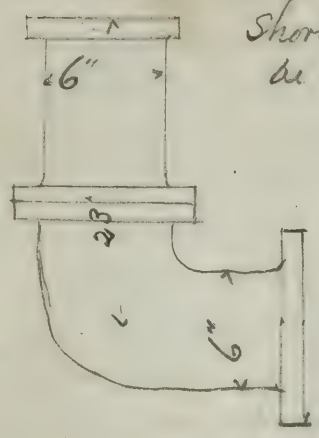
Length from centre Main Pump Cross to Pump Rod

Length Cross 30' 11"
Deduct 6 10 1/2 for length of Bell crank
29 3/4 Tape was 1/2" short
Allow 1/2
Then 29 ft. 11 inch length between centres of Connecting Rod —

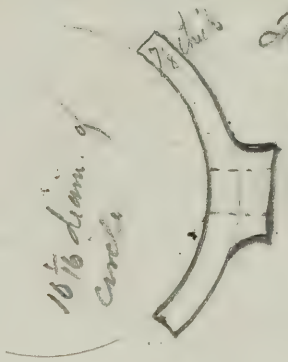
Length 29 ft 11 inch deduct 2' 8 1/2 x 2 = 5' 5"
5' 5"
23' 7 1/4" = length of Connecting Rod. Main —

Length of Bal. Con Rod —
18' 2 1/2.
Add 2'8 1/2" x 2 = 5' 5"
23' 7 1/2" = Length of Bal. Rod Con. Rod —

For Exhaust Pipe of Pumping Engine at Central Shaft.
July 18th 1871 –

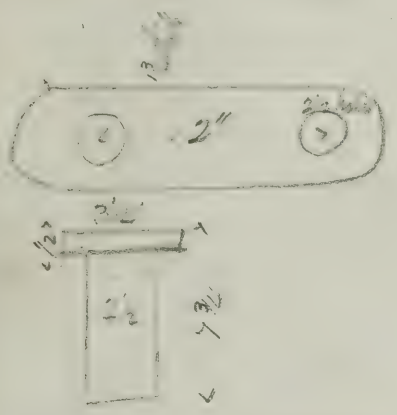


Short Matching Piece & Ell wanted. The length 23" can be made about 8" longer if necessary –



Flange to fit 10" (outside diam.) of Pipe at Cen. Shaft.
July 17 1871

For 3" nut from Pipe to be screwed in –



See Page 58 for calculations.
Diam. of Gear to take the place of Shaft [illegible] on Leader. Screw in Bending Frame –

1' – 3/8". on [illegible] of Shaft –

No of teeth in large Gear 30 –
" " " smaller – 12

Face of mill. Gears & stand Plate 3/2" between Wall of Cylinder & Balance Wheel of Pumping Engine – on 12 teeth Pinion –
Face of large Gear clears wall 3/4" – 4.
Shaft – 4 1/2 diam – 2/2 diam of hole in Gear
" " " is 7 1/2 long – Inside sump – 1 1/2 between face of Gear and the bearing [illegible] – take 1 – 3/4" clearance – of 4
The Gears now on, are 2 1/4" face. 1 1/8" Pitch –
" " to be 2" " any pitch to conform to conditions.

Allowance must be made for change of Gears on Leader –

A new Chain was put on July 27th 1871 – Will probably wear a little in a month – The stove Gears can be made another that time.

79

[illegible] Length Centre of [illegible]
[illegible] 2' 1½
29 Length of Rod [illegible] 23'

Crank Shaft —

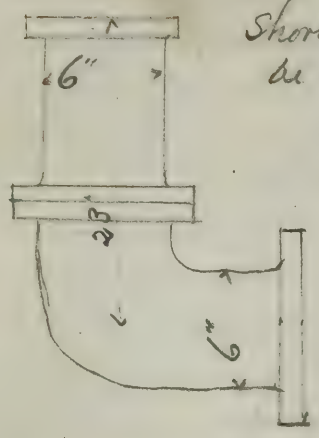
Body [illegible] —

Length from centre Main Pump Beam to Pump Rod
Length line 35' 11"
Deduct 6 10½ for length of Bell crank
29 ¾ Take max ½" short
Allow ½
Max 29 ft. ½ inch length between centres of Connecting Rod —

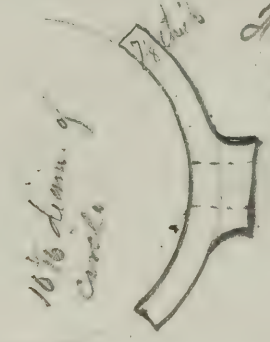
Changed to
29 ft. ¼ inch deduct 2' 8½ × 2 = 5' 5"
5' 5"
23' 7¼" = length of Connecting Rod Main —

Length of Bal. Con Rod —
18' 2½
Add 2' 8½" × 2 = 5' 5"
23' 7½" = Length of Bal. Bob Con. Rod —

For Exhaust Pipe of Pumping Engine at Central Shaft.
July 18th 1871 –

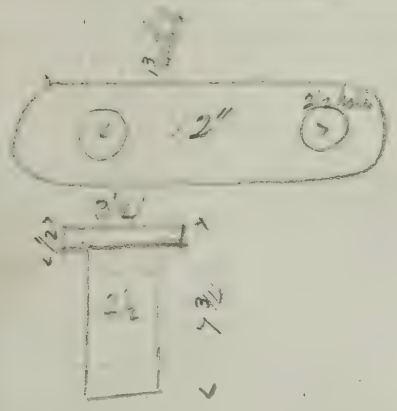


Short Mating Piece & Ell wanted. The length (23") can be made about 8" longer if necessary –



Flange to fit 10" (outside diam) of Pipe at Cen. Shaft
July 18th 1871

For 3" nut from Pipe to be screwed in –



See Page 58 for calculations.
Spring of Gear [illegible] of Chain in Crane Loader. Series on Hoisting Drums.

2" – 3/8". on [illegible] of shaft –

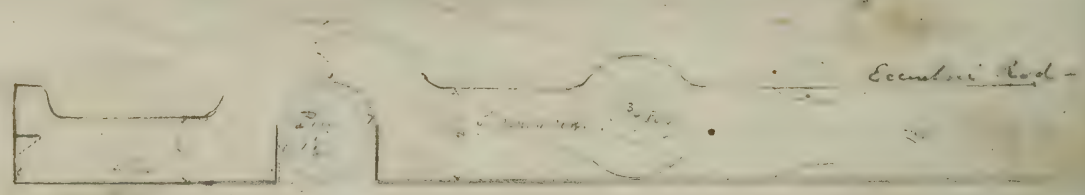
No of teeth in large gear – 30 –
" " " " smaller " 14

Gear on middle of Crank – should [illegible] 1/2 between [illegible] of Crank – Pitch of Crank [illegible] of Pumping Engine [illegible] Crank –
Face of large gear clear main 3/4 — A.
Pitch –
2 1/2 diam – 2 1/2 diam of hole in same
" " " is 7½ long – Inside [illegible] the bottom [illegible] gear and bearing of [illegible] – take from this 3/4" clearance – of A.
[illegible] 2" [illegible] any pitch to conform to conditions.

Allowance must be made for change of gears on [illegible] –

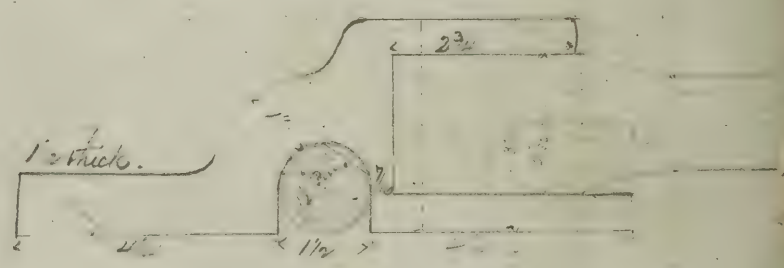
A new chain was put on July 27th 1871 – will probably wear a fortnight or a month – The stove gears can be made another short time.

Unhooking Gear for Pumping Engine - Central Shaft -
On Main Valve - Eccentric Rod -
Stroke of Valve 3 1/16" -



[illegible] Rod, [illegible] tops of [illegible] end of Rod 5' 1" allowing 3" [illegible] the Varied Eccentric Stroke - [illegible] forged end D for the Hook - Rod 1 1/2 diam at Hook end 2" at Strap end -

31 3/4
13 1/2
18 1/4

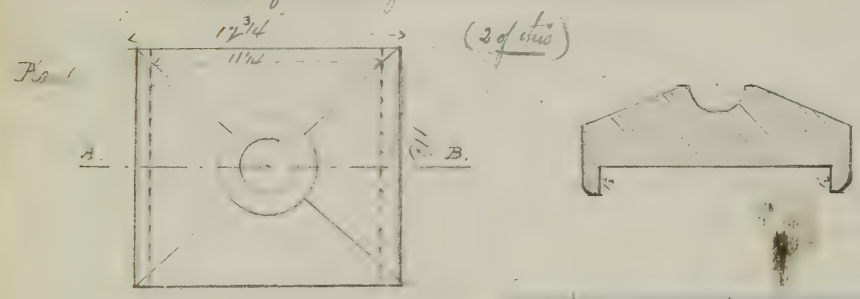


Weight of [illegible] of Balance Rod Con Rod - 2 7/16 Lbs.

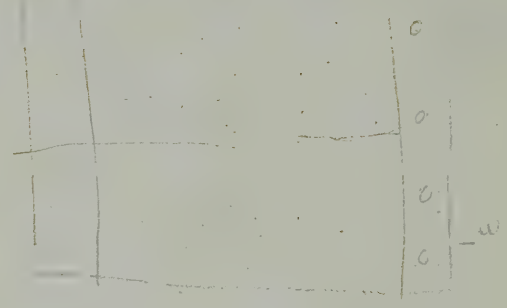
Beam
Electric shaft
Engine Room

Plates, Sockets, Screws, &c. for Braces of Foundations of Pump Gear. Central Shaft. Aug. 10th 1871.

Plate for head of screw. ——— Section A.B.



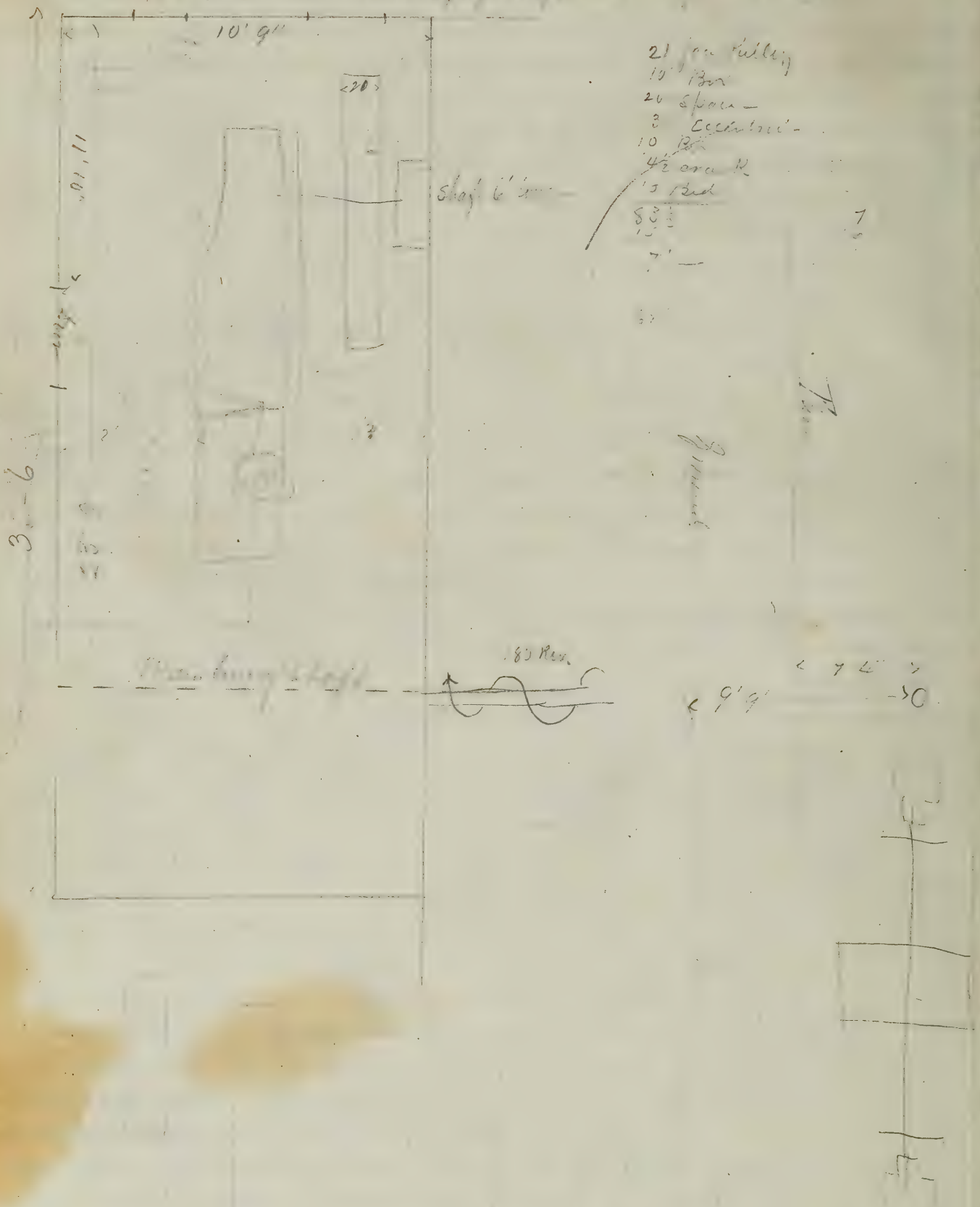
Plan of upper course of stone Central Shaft Pump Well



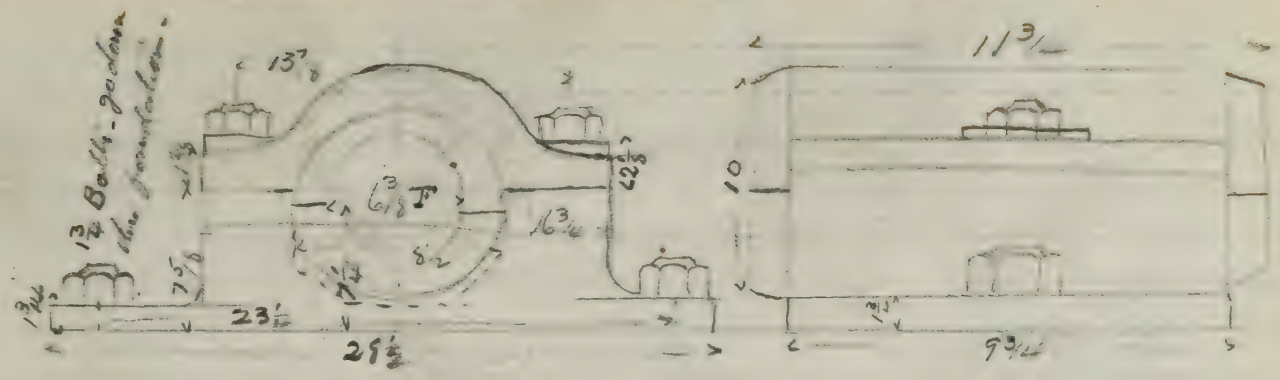
3' 9'
10' 6'
2" Rail
3' 10"
10 - 6"

2' 2 1/8"
5"
6 1/2

5½


10' 9"
Shaft 6' in
3'-6"
9' 9"

Outboard Port — [illegible] Cyl. for [illegible]



The Engine Cyl. Pattern, was made by "chronic Rule" + 1/8 on each side for finishing this was too much and the [illegible] can be cut off - the casting did not shrink as much as allowed - the Port-core did not leave stock enough above the bends to have a thick edge after planing up - The planing-Bed should be 3/8 high in steam chest the casting drawing so much - Front Wheel Engine Crank Beam Way

End of crank to end of Shaft Bearing 10 1/4 -
End of slide to end of cyl. 16 3/16

Ec Rods 2' 1/16 clear.

Drain shaft, ~~[illegible]~~ after end 6 3/16

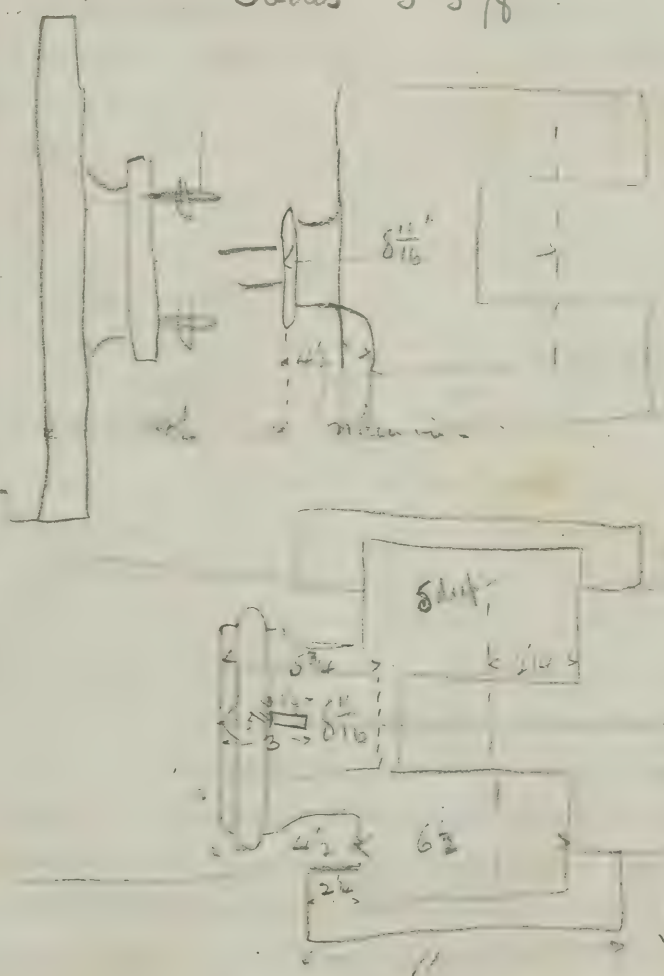
Centre line of cyl. to outside of [illegible] 15/16

Con. Rod 6' 6"

End of [illegible] to Con. shaft - 9' 7 1/4 + 1 1/8 = 9' 8 3/8" -

V diam. [illegible]

Slides 3' 5 5/8



Cyl. & Shaft. Eccentric & Rods
Dec. 4th 1871

Cylin. centres of Bed.

8 Bolts 7/8" d.

1 3/32 thick.

Cyl. head.

26½

Area = 4.8 sq. in.

26¾

13½

26¾

Rods 1½" diam.

4.62
.93
1386
4158
4.2966

Diam. of Cyl. 16½ in.
1" - 1/32 thick

19⅝

13½

20⅞

Rock-shaft can be 27¾ long, cen. to cen.
" " 8" from cen. V. Rock to cen. Ecc. Rock.

20⅞
2 5/16
18 9/32

Crank shaft
Cen line of Reel
Shaft. 6 3/64 diam
Rock shaft. 2 5/8 diam 1 Cen
Top of bed 4 1/2 wides 9 7/16
Fall in length of cyl
Bolts
No bed

Central Shaft –

Scan of Shafts on Small Pump –

On Pump Gear – inside frame 2 7/16 –

Hole for Crank Pin – 2 3/4 diam

Outside to outside of Boxes 5' 2 1/2" – north frame –

5' – 2
1 1/2
6' – 4

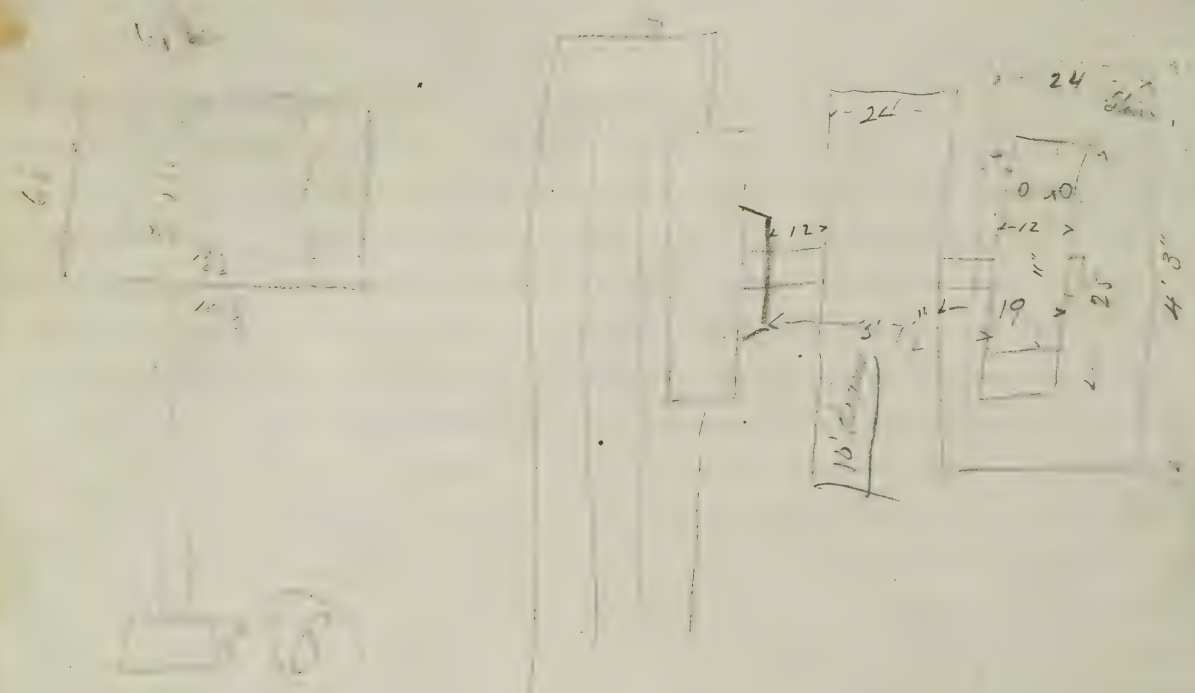
Line Shaft in shop 1 15/16 diam –

Pulley for New Lathe – same diam as in Counter

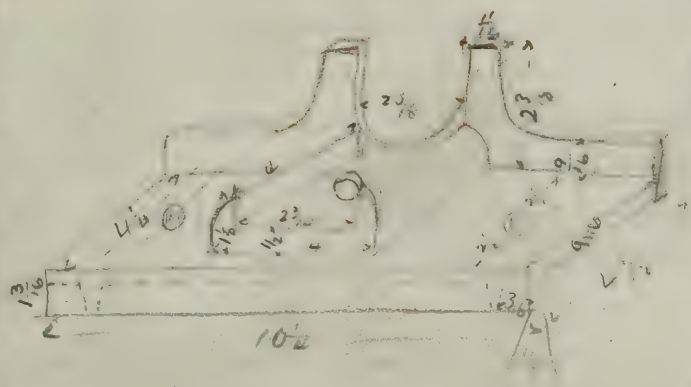
Bearing to be larger for running back faster –

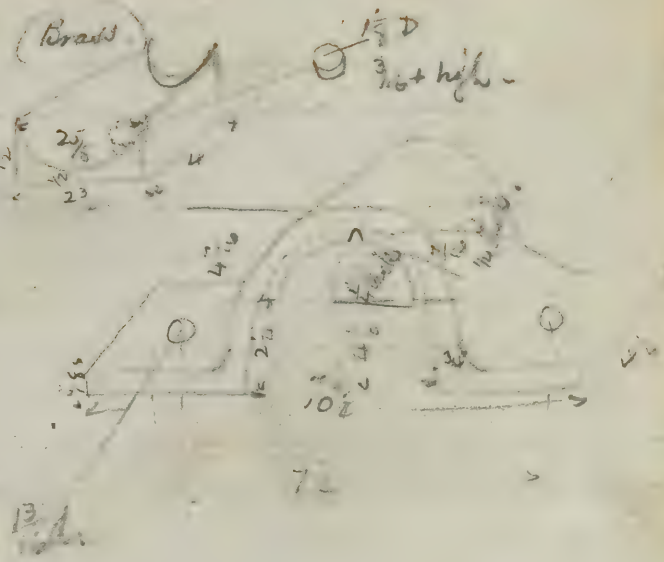
Clamp Pulleys –

Johnson Engine – Crank Shaft & Pulley –

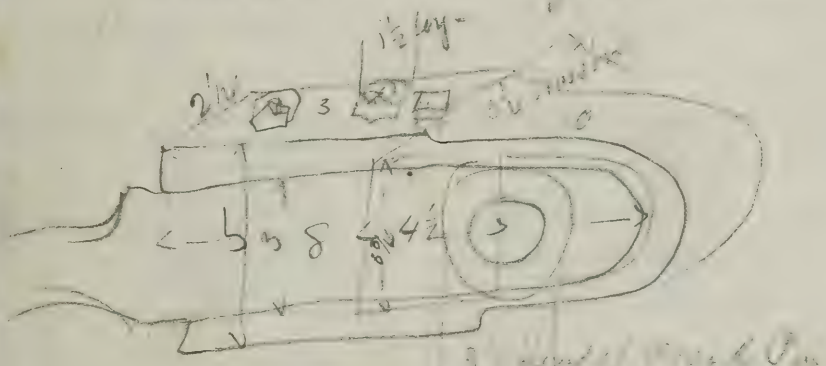


Car, wheel axle Frame





Offset & car Frame Iron



Armed Sea Engines Point work.

Length of Cyl. 37½ — Cylinder flange, middle, blade projects

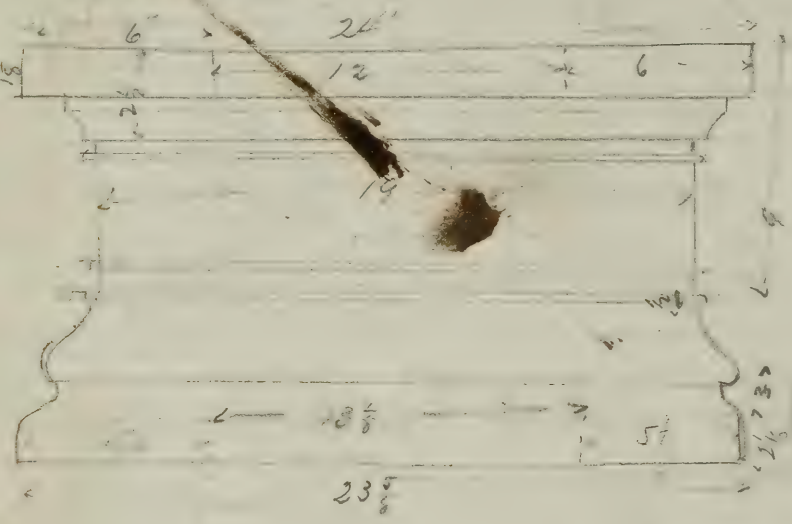
End of Cyl. to end of stuff box bolts 4'

Top of bed to cyl. centre 8 7/16 —

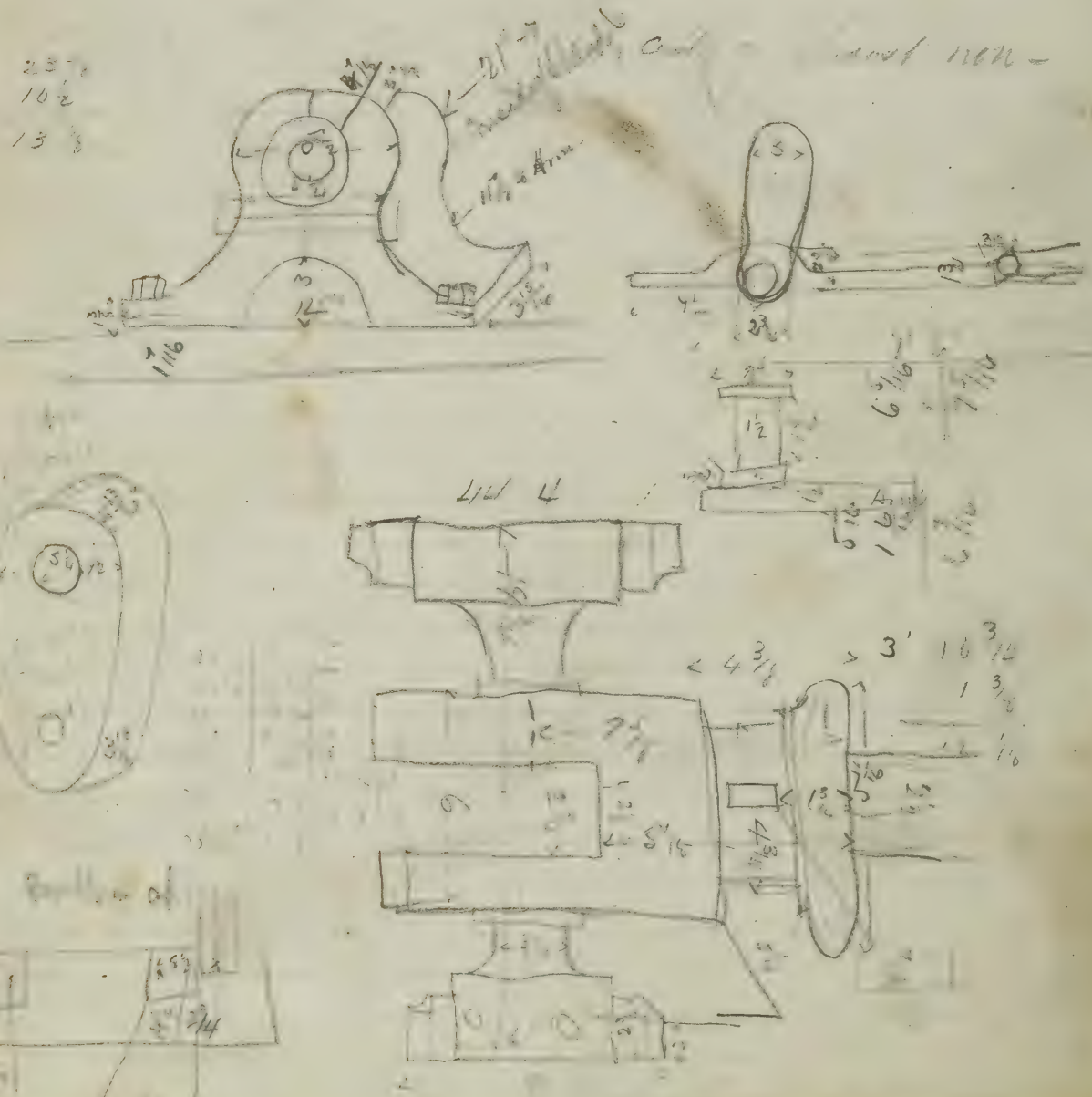
Bed 24" wide — Stroke of Cut off eccentric 2½ ins.

21½ [illegible] each 6⅜ wide & 2" thick —

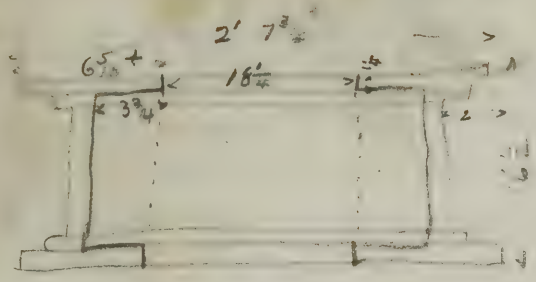
End of Cyl. to end of Stuff-Box bolts 10¾ —



cut off of stions work.



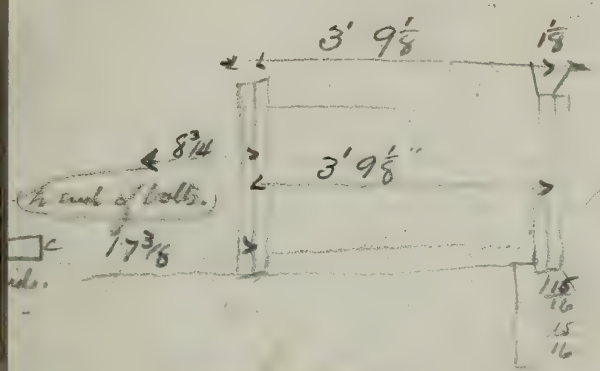
Oldwood & Co's Engine Lower Mill -



Top of Bed to Cen. cyl. - 6 3/4 -

Stroke 36" - (Throw 15 1/2 di. cyl.)

Cyl. bed over heavy bed.



Cen. line of cyl. to outside nose of box. 17 3/4 —

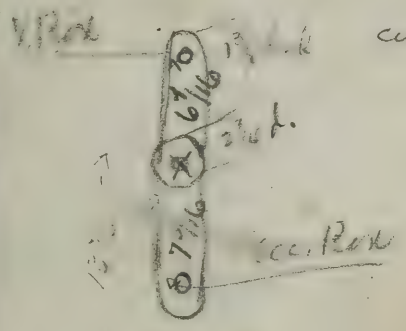
Width across slides. 29 7/8
between — " 15 7/8
width of each slide 7"

Cen. P Rod to outside of slide - 15" —

Cen. P Rod to cen. R. 13.
Top of bed to Cen. R.S. 13 5/16

Crank - 2 1/2

Cen. throw 3 3/16" —



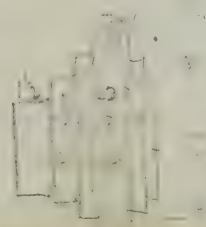
Cen. R Shaft to end of cyl. - 4' 0 1/8 -

Engine to Run 74 - Rev -

Pulley

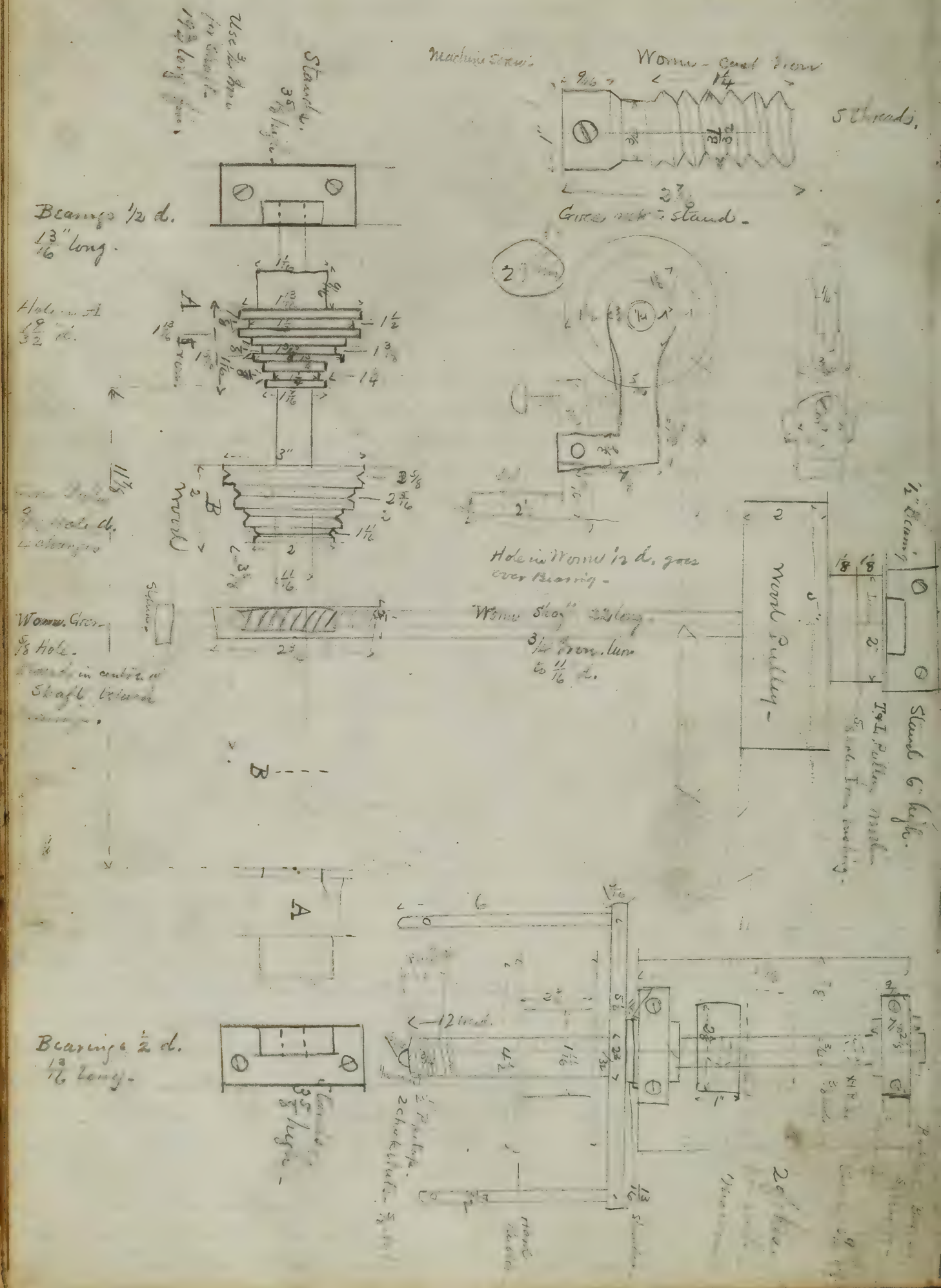
Mean Length of Con Rod - 9 ft. Length of slides - 3' 8 3/16"
From end of cross head to end of cyl. - when in stroke - 11 5/8
Size of Ecc Rod - 1 11/16 Nom - Length - 4' 6" end in Ecc. to Cen. Pin.
" " Pins in Rock-shaft - 1 1/2 in Lower
Width of Rock-shaft Arms -

End of Bed to Cen. shaft 3 4"



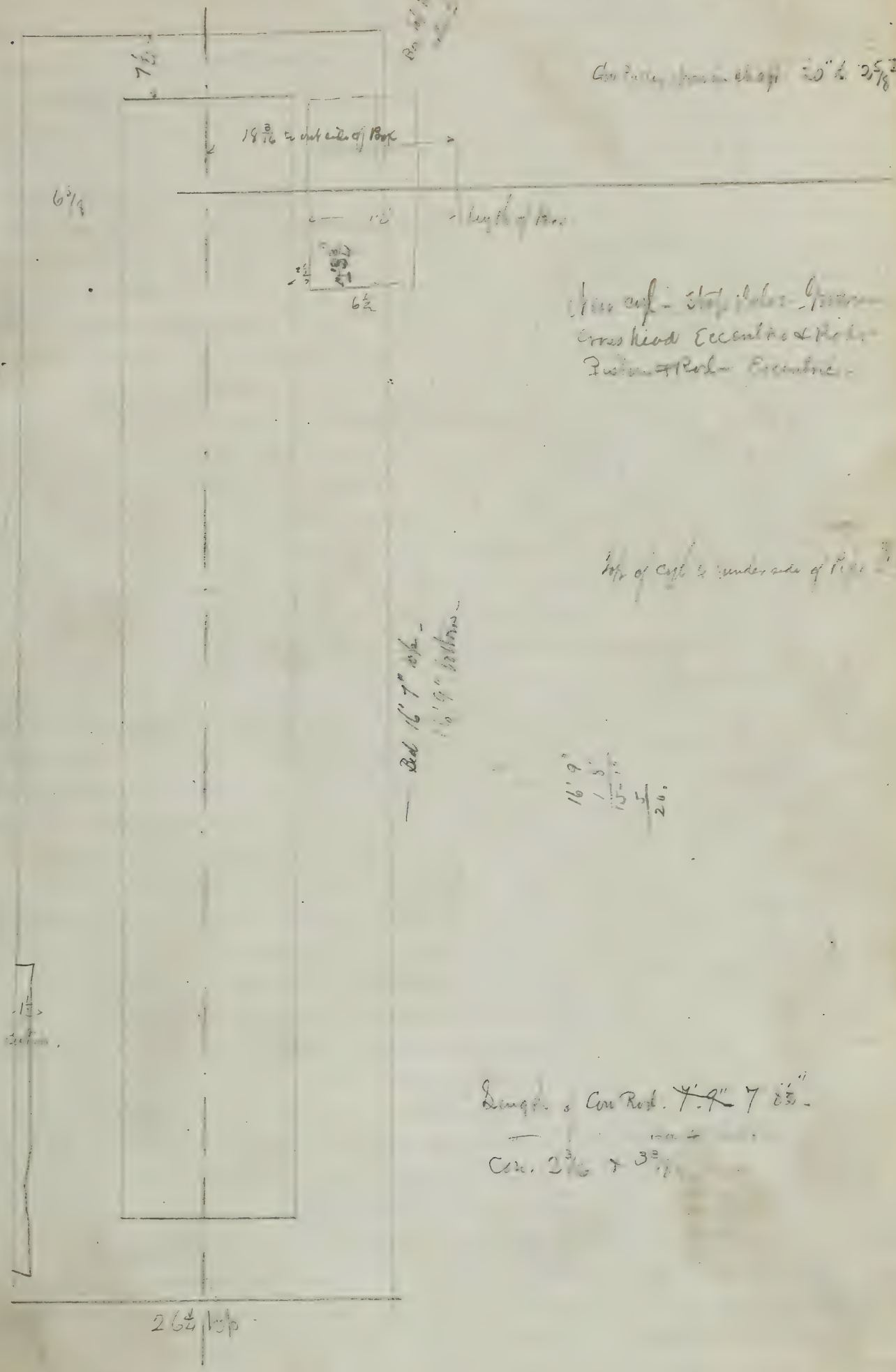
= 3' 9 1/8
15 7/8

Brown & Bro's Wire Covering Machine
March 1st 1872



Marine Engine — April 17th 1873 —

52 Revolutions —



Cor Piston from chaff 30" to 35 5/8"

Chain cuff — Stop Valve — Spanner
Cross head Eccentric & Rods —
Piston & Rod — Eccentric —

Top of Cyl to underside of Floor 3' 1½"

16' 9"
1 3/4
15 1/4
20

Length of Con Rod. 7'-9" 7 1/2"

Con. 2 3/16 & 3 3/16

Fit the Pin when taken off

Steam Room
100' 7"
150'
Old Mill foundation
38' 3" inside
42' outside
15' 6"
80'
Lap Room
32'
31' 8"
12' 4"
7' 6"
30' outside
30' wide
30' deep

Johnson Mills – Timber – 12 × –, 12 × 2 × 11 × 2
walls – 2' – 20 × 16 to [illegible]
Plan 200 × 50 inside dimensions –
Floors – 12 + 13 + 14. top to bottom Floors –

The Drawing Vault – Posts 8' cen to cen. 1' in centre of inner span unequal at ends – Engine shaft 21' to cen of Jack shaft – Fly wheel 8' 6" 2' 6" inside edge of – to wall –

Centre Shaft — Jerry 21st 1[illegible]

Length of 6" Shaft — 16'-5" — Coupling 2" [illegible] new
— end of shaft to end of coupling new 16 —

The diam of coupling gan be 17½" diam to clear wire rope —
can wear 1" on the new shaft & be made —

Flange of Shaft — [illegible]
[illegible] coupling
" " " [illegible] 1½" 2" for [illegible] from coupling
[illegible]
" [illegible] Bore —
[illegible] on end of shaft

Length of [illegible]

[illegible]

[illegible]

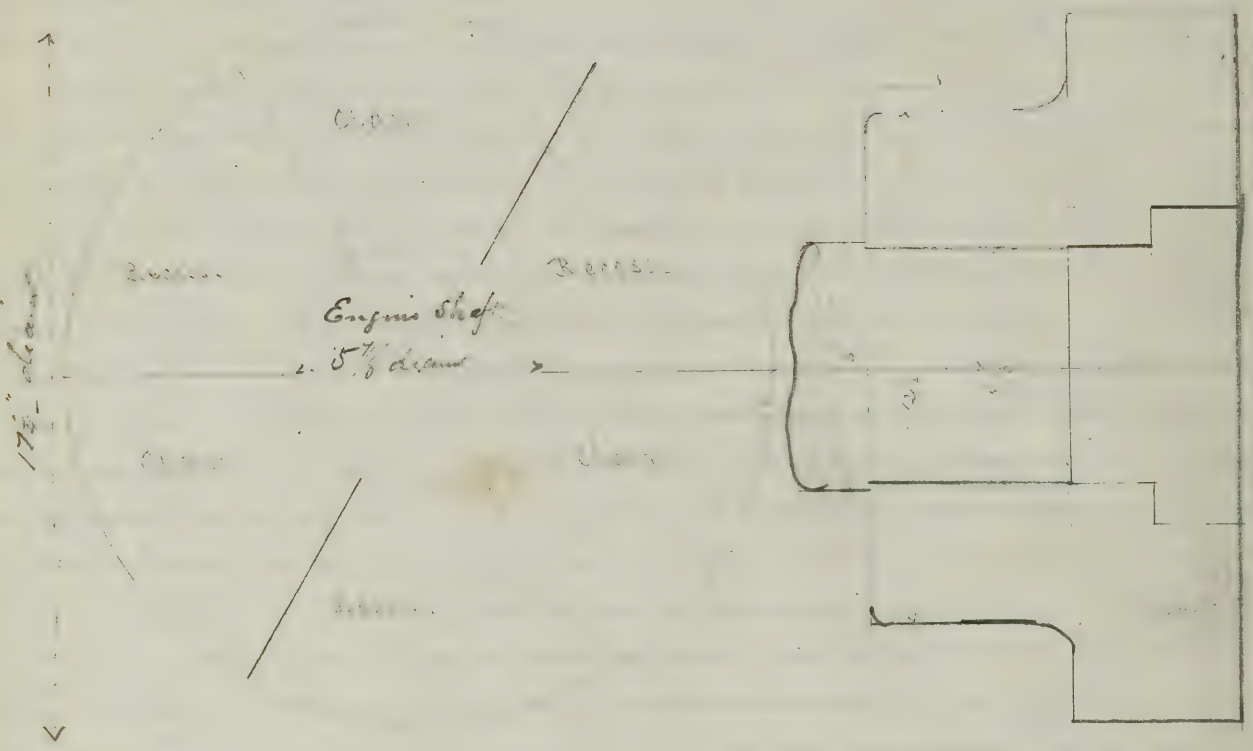
[illegible]

Note — Rules for small Pump Sup on [illegible] shaft [illegible]
be made 1" — to bring centre of shaft right —

[illegible]

Head of Pump
Rest of Pump

Cross Section of Shaft of Pumping Engine — Centre Shaft.



List of Shafting Pulleys Couplings & Hangers & Jetblis Mill
Aug 23-1873

1st Floor begining with South side
first line 57' x 2" - 4 pr couplings - +
+ 12 Pulleys 16 x 6
x 1 " 20 x 8 Counter Line
+ 1 " 24 x 10
+ 1 " 20 x 6
9 Hangers 12 x 2 light Pat

2d line same side of Mill 57' x 2"
+ 2 Pulleys 20 x 8
+ 1 " 21 x 10
x 10 " 16 x 6
x 1 " 24 x 13 Counter Line
+ 1 " 14 x 5
4 pr Couplings
9 Hangers light Pat

3d line 58' x 2 - 4 pr couplings
+ 20 Pulleys 16 x 6
+ 1 " 22 x 8 Counter Line
9 Hangers

4th Line 52' x 2" 8 Hangers
+ 12 Pulleys 16 x 6
+ 1 " 14 x 6
x 1 " 12 x 4 Counter Line
+ 1 " 12 x 4
+ 1 " 20 x 8
3 pr Couplings

Shafting & Pulleys Made Aug 23-1873
taken by John B. Sylva & Myself
J. E. Hunter

Main Line
92' x 3" coupled with 3 lengths 2½ = 22' = 114

x 1	Pulley	4' 9" x 14"	x 1 Pulley 3' x 10"
+ 1	"	3' x 18"	x 2 " 2' 6" x 8" x 10"
+ 2	"	1' 2" x 6"	3 Hangers 2½ x 12
+ 1	"	2' 4" x 12"	3 pr Couplings 2½
+ 1	"	1' 8" x 8"	6 Strap Hangers 3" x 12
+ 1	"	2' 4" x 14"	8 Hook " 3" x 12
+ 2	"	1' 4" x 6"	light Pat
+ 2	"	2' 4" x 10"	11 pr 3" Couplings
+ 1	"	2' 6" x 14"	1 " " Clutch Coupling
+ 1	"	4' x 21"	
+ 2		1' 4" x 6"	

~~5 L~~ 4 lengths 2½ Shafting 32'
~~4~~ Hangers 2½ light Pat
4 " 2½ Self Adjusting Pat
1 pr Clutch Couplings
X 4 Pulleys 30 X 10
X 1 " 30 X 8 Connect Lines
X 1 " 24 X 10
X 1 " 30 X 8

2 Short lines 74' X 2
X 12 Pulleys 13 X 6
X 2 " 20 X 8 Connect Lines
X 1 " 15 X 6
12 Hangers light Pat
6 pr Couplings

2 Short lines 49' X 2
1 Pulley 24 X 8
X 1 " 20 X 8
X 1 " 16 X 10 Connect Lines
X 1 " 14 X 6
X 1 " 18 X 6
X 1 " 22 X 4
11 Hangers light Pat 3 pr couplings

4 Countershafts 24' X 2 in
X 1 Pulley 20 X 8
X 1 " 22 X 4
X 4 " 16 X 6
X 1 " 12 X 6
X 4 " 8 X 4
X 1 " 9 X 6
8 Hangers 12" X 2"

6588# Shafting
3925# Hangers
2175# Couplings

91 Hangers in this room

Basement Line

3 Length 3i coupled with 8 lengths 2½" =
22' + 56' = 78'

X	1	Pulley	36 x 16
+	1	"	28 x 12
X	1	"	24 x 6
+	1	"	24 x 8
+	1	"	18 x 8
X	1	"	24 x ~~8~~ 10
+	1	"	24 x 9
+	1	"	36 x 8
X	1	"	24 x 12
+	1	"	24 x 12
X	1	"	24 x 12
+	1	"	24 x 8
+	1	"	24 x 12
+	1	"	24 x 9
+	1	"	24 x 12
+			24 x 12
+	1	"	30 x 6
+	1	"	36 x 16
X	1	"	24 x 8
	~~2~~	"	~~27 x 6~~
+	1	"	32 x 9
+	2	"	28 x 10

~~8~~ Strap Hangers 8' x 3'
9 Hook Hangers 8 x 2½
2 Pr couplings 3
9 " " 2½

2280" Shafting
700 Hangers
750 Couplings

Basement Room

1 counter 8' x 2½
2 - Light Hangers 8 x 2½

1 Counter Line ~~8~~ 2' x 2"
12 Pulleys 16 x 6
13 " 16 x 8
12 " 16 x 6
13 " 13 x 6
1 " 10 x 6
4 Pr Couplings - 9 Hangers very light

24 Hangers in this room

Weave Room 2d Floor So Side

2 Length 2½ coupled with 9 length 2"
16' × 2½ + 66' × 2" = 82'

X 1 Pulley 32 × 8
X 10 " 24 × 9"
X 1 " 22 × 6
6 pr couplings
18 Hangers light Pat

2d Floor

2 lengths 2½ coupled with 11 lengths 2 in
9 16' × 2½ + 78' × 2"

X 9 Pulleys 24 × 9"
X 2 " 22 × 5"
X 1 " 32" × 9"
X 1 " 30 × 12
X 1 " 20 × 9
X 1 " 20 × 9
X 1 " 9 × 6
8 pr couplings
14 Hangers

2834# Shafting
2100# Hangers
760# Couplings

3d 1 length 2½ coupled with 11 length of 2
7' × 2½ + 78' × 2

X 1 Pulley 32 × 8
X 10 " 24 × 9
5 pr couplings
15 Hangers
X 2 Pulleys 20 × 9
X 1 " 18 × 10

All the Hangers in this Room are 1½ in shafts

2 in	coupling	pr	pr	40#
2½ in	"	"	"	50
3 in	"	"	"	70

14" × 2" Hanger 50#

42 Hangers in this Room

Weave Room

Card Room Counter 5½' × 2

2 Hangers 14 × 2
1 Pulley 16 × 6
1 " 13 × 6
1 " 20 × 8

55" Shafting
100" Hanger

2 Hangers in this room

Attic Room
5 Counter Shafts 29' × 2"
10 Hangers 12 × 2
1 Pulley ~~[illegible]~~ 7 × 6
× 3 " 20 × 8
× 3 " 16 × 6
× 2 " 13 × 6
× 1 " 14 × 6
× 3 " 16 × 6
× 1 " 13 × 6
× 4 " 16 × 6
× 1 " 13 × 6

290" Shafting
450" Hanger

10 Hangers in this room

Shaft running from Bride Mill to Spinning Room in Rear 1 56' × 2" = 560" Shafting

Line in Basement of Spinning Room
24' × 1½"
7' × 2" Shafting
4 Hanger 12 × 2

4 Hangers × 5 Pulleys 16 × 6
× 1 " 16 × 9
× 2 " 16 × 6
× 2 " 13 × 6

290" Shafting
360" Hangers
8 Hangers in this room

Machine Shop Shafting

22' × 3" Shafting
38' × 2" "
8' × 2½ "
1 pr couplings 3"
2 " " 2"

1 Pulley 24 × 8
1 " 24 × 6
1 " 12 × 6
1 " 30 × 8
3 " 16 × 6
1 " 9 × 6
1 " 14 × 8
1 " 30 × 12

992" Shafting
150" Couplings
805" Hangers

5 Hangers 12 × 2
2 " 12 × 2½ Side Pull
4 " 12 × 2½ " "
2 " 12 × 3 × Strap

13 Hangers in this room

~~Hangers 12 × 3 × 3 Straps~~
~~2 Pulleys 24~~
~~1 " 1~~
~~1 " 2~~

~~Dynamo Room~~

~~68' × 2" Shafting not fin~~
~~1 Pulley 20 × 8~~
~~1 " 10 × 6~~
~~1 " 16 × 6~~
~~3 pr couplings~~
~~Countershaft 12' × 2"~~
~~1 Pulley 16 × 8~~
~~1 " 20 × 8~~
~~2 " 24 × 8~~
~~2 " 24 × 6~~

~~1050" Shafting not fin~~
~~200" Hangers~~
~~120" Couplings~~
~~Countershaft 14' × 2~~
~~2 Pulley 16 × 8~~
~~1 " 14 × 12~~
~~1 " 15 × 6~~
~~4 Hangers 12 × 2~~
~~4 Hangers in this room~~

~~Gen Ca = 16' × 2~~
~~1 Pulley 22 × 8~~
~~2 Pu 14 × 6~~
~~1 " 15 × 8~~
~~8 24 × 4 Incl Pulley~~
~~20' × 2"~~
~~2 15 × 30~~
~~30' × 1~~

~~2 Inches 2~~
~~8 " 4½~~
~~4 " 1~~
~~3 " 4½~~
~~1 " 1½~~
~~2 Inches 2 Pulleys~~
~~2 Inches 2 Pulleys~~
~~2 Inches 2 Pulleys~~

Piping at the Tyler & Bliss Mill
Aug 23/73

Dry Room over Dye House
1232' × 3/4" Pipe
52' × 2" "
6 Manyfolds 20 Pipes Each

Attic 660' × 3/4" Pipe
5 Valves
4 Manyfolds 2 Branches

Card Room 1156' × 3/4" Pipe
5 Valves
4 Manyfolds 4 Branches

Mule Room 990' × 3/4" Pipe
5 Valves
4 Manyfolds 8 Branches

Finishing Room 725' × 3/4" Pipe
5 Valves
4 Manyfolds 4 Branches

Fulling Mill Room 500' × 3/4"
9 Valves
2 Manyfolds
120' × 4" main Pipe running under Road to Dye House 63' to Dye H

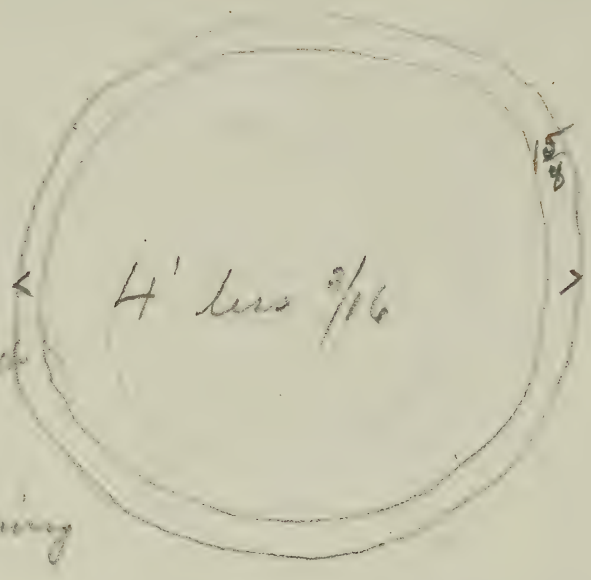
also 120' × 2" & 63' × 2"

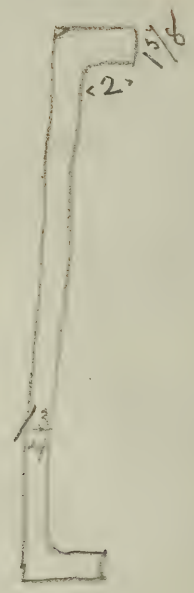
Spinning Room Rear of Main Brick Mill
438' × 3/4" Pipe
4 Valves

Dye House
56' × 4" Pipe
57' × 2½" "
26' × 2" "
143' × 1½" "
68' × 1" "
160' × 3/4" "
3 Valves 2½"
3 " 2"
4 " 1½"
4 " 1"
3 " 3/4"
1 " 1/2"
2 Manyfolds 6 Branches × 3/4 Pipe
2 " 3 " × " "

Machine Shop
600' × 3/4"
2 Valves 3/4"
1 " 1"
1 " 2"

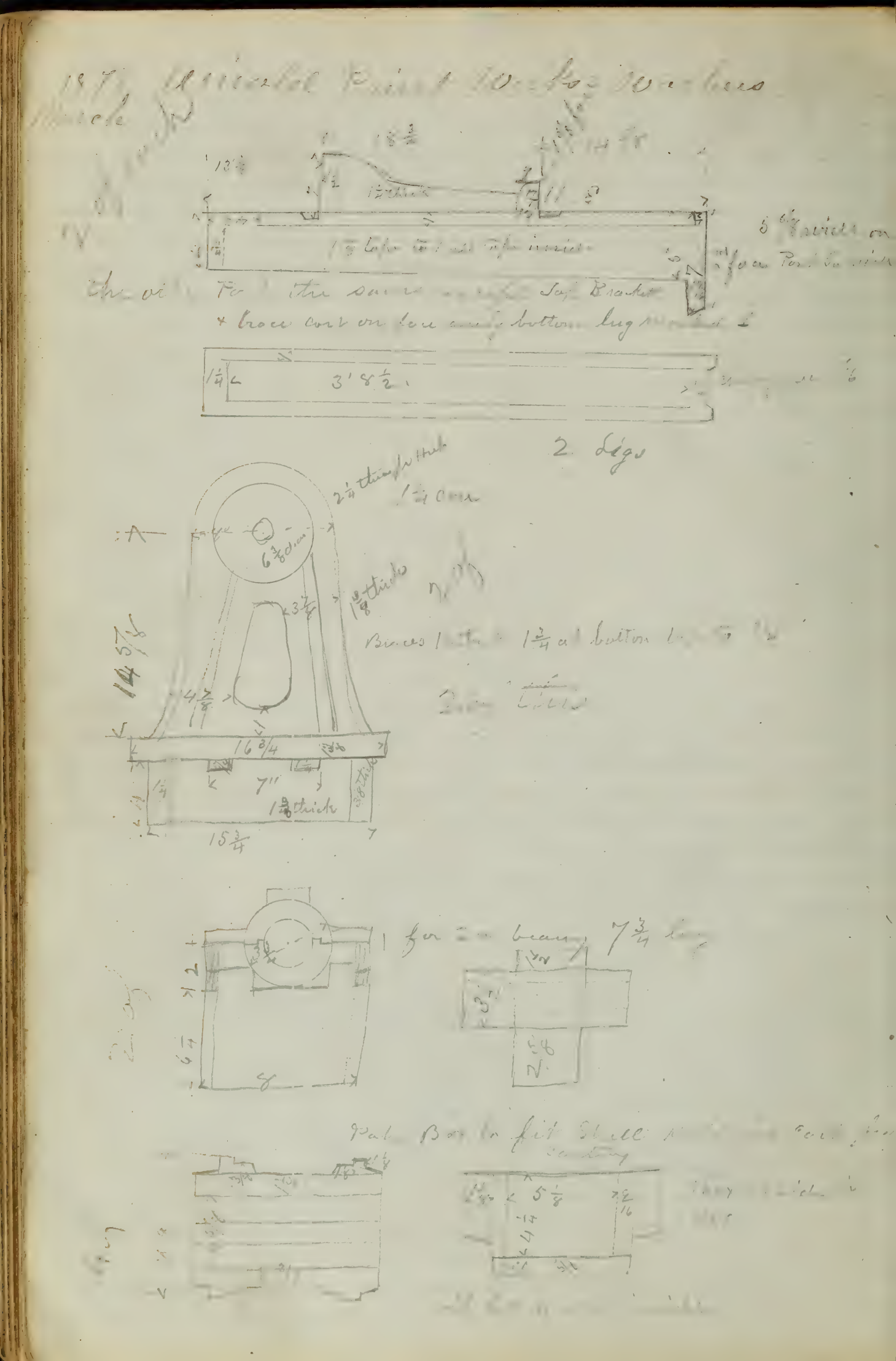
List of Piping Valves &c taken Aug 23 - 1875
by J. B. Tydd & Myself
J. E. Hunter

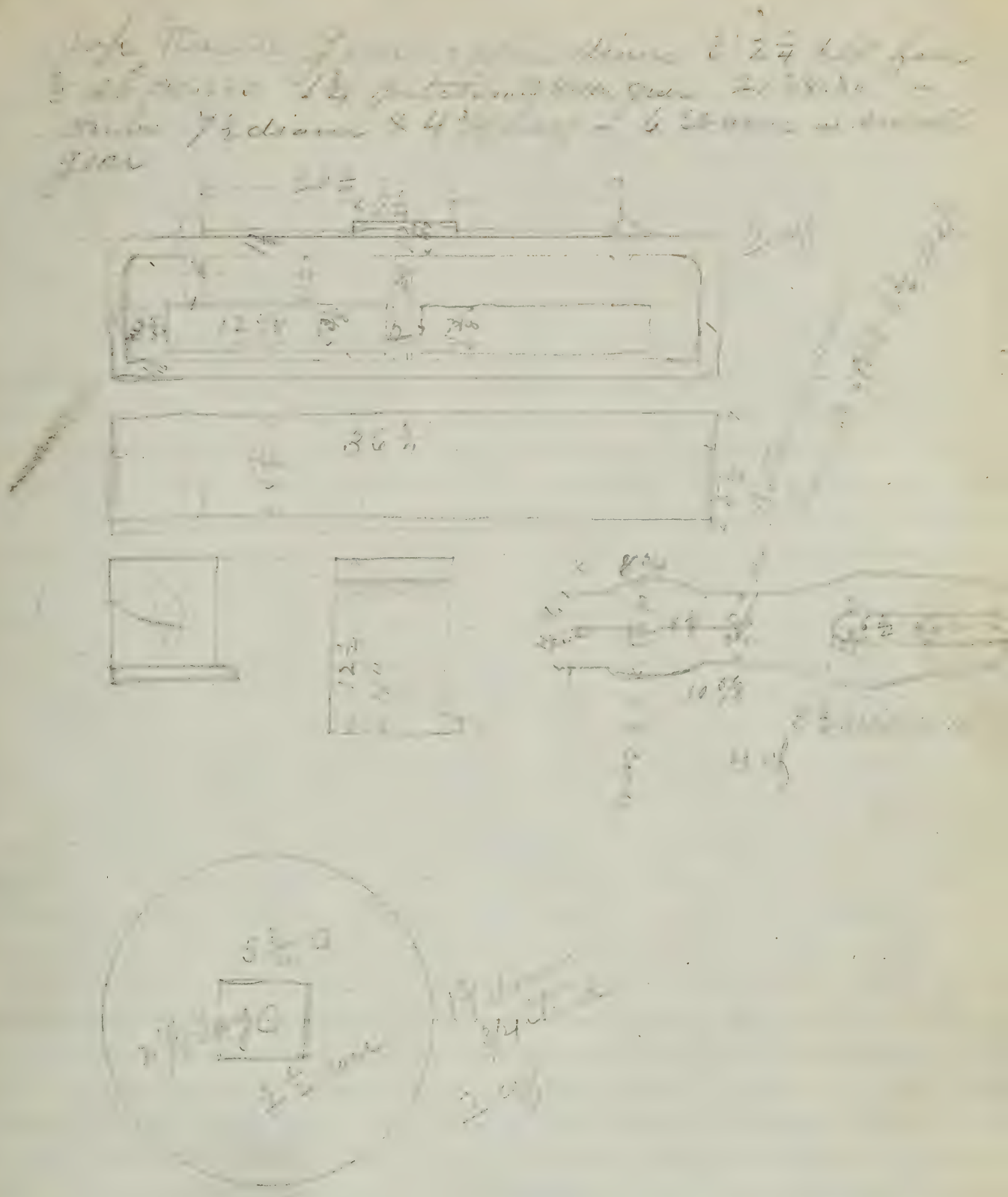




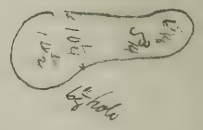
36" hole through
head
face up the
plate when ring
goes on

Cover 1 3/8 thick

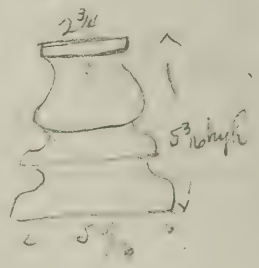

1 for the same
Seat Bracket
+ brace cast on
bottom lug
3' 8 1/2
2 Legs
2 1/4 thick at hub
1 1/4 Core
6 3/8 dia
3 7/8
1 3/8 thick
4 7/8
14 5/8
16 3/4
7"
1 3/8 thick
15 3/4
1 for the beam 7 3/4 long
5 1/8
7 1/2
6 7/8
8
Pat. Box to fit Shell
5 1/8
7 1/2
4 7/8



Blackstone Engine — Dimensions to find — end of Bed to cen. Shaft 20"
Length of Bed — End of Cyl. end to cen. Crank shaft — or other end to same
" " Con Rod 7' Length & size of Cross Head —
Sizes & dimensions of Slides, Same as Johnson — Large size Small size
" " of Crank Shaft. Neck $4\frac{3}{16}$ straight $14\frac{1}{2}$ & $6\frac{9}{16}$
Cen. line of Cyl to outside of Pillow block — $18\frac{3}{16}$
Top of Bed to cen. of cyl $8\frac{5}{16}$



Stands for slides,
Slides $2\frac{1}{4}$ wide
" $4\frac{3}{16}$ wide —



The Cen. Jack Bar will be 19 feet ~~8 long~~ & will be cut to proper length & welded here — at shaft —

Length of Pin in Bushy Head &c — 2' 5" See Page 76 —

There is an order for Pins for ~~Main~~ Main Bob in the Office at Wh. Adams.

Main.

~~Take down one of Crank Pin in place —~~

Mortise for Central Shaft. To stay the frame of Governing Plate to receive the heads of Jack-screws —

2 { 1 to go on end of Timber, & 1 to go under back cross pattern —

2 { Cols — to go into the ends of Pipe Struts, with female screw — 1 for the end of 8" Pipe & 1 for 6" Heavy pattern Pipe —

1 Socket Plate to receive end of 6" Pipe & the foot foundation casting —

1 Slot Plate to go the length of Post of frame cross fits into the Shoe — Plate already in place —

1 Corner Plate to receive end of short cross Tie

The same according to Sketch on Pl. 83 —

Main, for Central Shaft —

~~The 2 Bolts holding Cole of 8" Strut — 1 Cross Tie on Cross & the length of the Foot cross Tie —~~ ~~{ Sub Sketch shewing [illegible] of Projection Bolt & Washer through Spar —~~

Sketch Sketch of Pin of Bal. Bob. Back end above Land & 8 Shaft Cam or Heavy Engine Wheel

Projection of 12 & 24" stick beyond saddle & Sullper plate in Main Bell Crank

Dimensions of Plate Bars on Bell Crank — & in Number. 4 & 1

Determine position of Hoisting Engines & Governing — Chain Drums & Gutter Pulleys above Shaft & Bros. Plan & Elevation.

Dimensions of Pump Fillen Blocks outward & inward — under & for. steampipes — Shewing the wheel in spokes and eyes —

Wire Rope — Size for — to be fixed & roll of Journal.

Sketch Plan of [illegible] Bearing [illegible] 3 Bars

Determine position of Air Pipes & depth of Socket between Mear [illegible] 3' 6"

Mem. for Central Shaft.
Find length of main pump shaft.
" " " Fulcrum " —
" Position of Boxes on " " Main Pump shaft.
Work Plan of Mg. Floor when Bell Crank will stand.

Mem for Central Shaft —

~~Give dimensions & diameter of Bolts~~ for Pumps.

See about Plan of bearing — ~~so as to move Main Pump~~
~~keep water the Rods~~ when it runs —

~~Show the manner of packing the Bucket Plunger of Drawing lift.~~
~~" " " Making the Poke to hold the same — whether~~
~~it be of Cast Iron like the one already working or of wrought Iron —~~
~~and full particulars of same —~~

~~Find the way of Connecting top of Pump Rod & Bell crank~~

~~The length of Bolt — Pole for Rods of Main Pump —~~

~~1. Lengths & dimensions for 7" shaft — flges for the bears — X~~
~~2. Diameter of 6" Engine Shaft — X~~
~~3. Breadth in the Bishop Rod & Socket — X~~
~~4. What changes is to be made in Pattern new here — no change 1st Bolts X~~
~~See if measures of flywheel is correct — X~~

~~Take a book of the parts of of Main Pump shaft bearings~~
~~in Bell Crank, and balance weight —~~
~~of the floor of Winding Engine Hse. of abutment on east side~~
~~of the Main Power & X the upper floor of Pattern —~~

See what Blocks are wanted for the gudgeons of the
Balance Bell Crank if any, or if they will be made at the
Shaft — Must be made by me —

~~Gudgeon Blocks or Plummer — See Mr Gilbert~~
~~Boxes — [illegible] — See of III~~
~~Must be nearly [illegible] — the Centre~~
~~is [illegible] for~~
~~1" Gudgeon —~~

Must have 2 Elbows of
same as Pump & 2
Matching Pieces on
tongued & one Grooved —

Steam Pipe Aug 23/73

Spring Room near Building

438' x $\frac{3}{4}$ - 4 valves

7
7
49

4 / 3.1416
.7854
49
7077.6
3 / 4 1 6
38.4936

7 / 16
2.28

$46\frac{6}{6}$

1.5 / 7.666 / 5
75

1.25 / 6.00 / 5
625

38.5
36
2310
1155
1386 #

38.5
12
462.0 in 1" high.

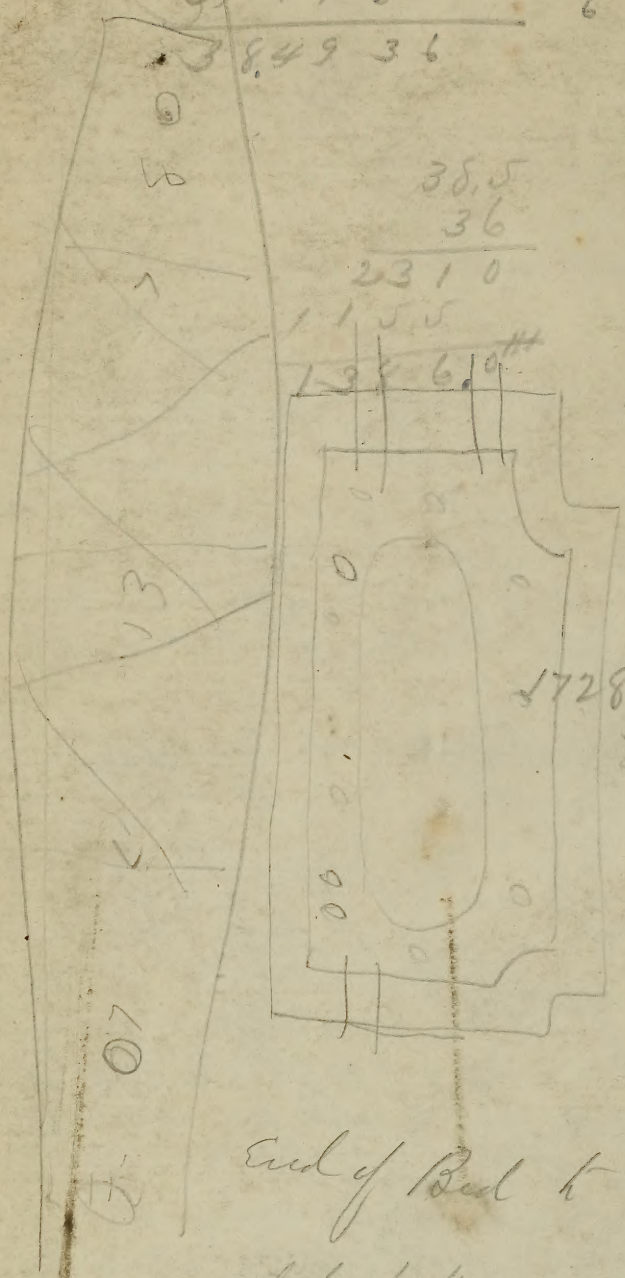
66
36
30

30
36
66

30" below bed to bottom of wheel

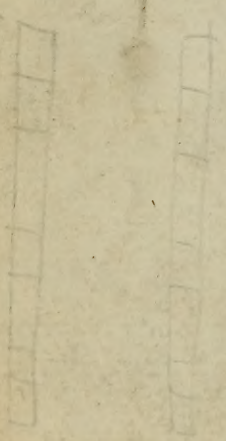
62.5
267.
4375
3750
1250
16687.5

1728 / 462.000 / 267.
3456
11640
10368
1272 0
2
8.3



End of Bed to outside of Pulley 19' 6"

end of shaft to edge of Pulley 1' 9"



$\frac{0.30}{1.20}$

8.0 | 22.0 (2.75)

2.75) 8.00 (2.84
5 50
2 3 4 0
2 2 0 0
1 0 0 0
1 6
5 0 4
8 4
1 4 4
1 1 0

.84
2.75
6 8
1 6 8
1 6 8
1 0.5 8

2.84
2.75
1 4 2 0
9 8 8
5 6 8
7.8.1 0

96
50
146
3
438

Dry room

6 Branches 20 Petitcoat

36 + 16' 2 Pin
16
52

14 Lights 48' X 3/4
60 " 26'